THE WONDERS OF NATURE AND ART;

BEING AN
ACCOUNT
OF
Whatever is moſt Curious and Remarkable
throughout the WORLD;
Whether relating to its
ANIMALS, VEGETABLES, MINERALS, VOLCANOES, CATARACTS, HOT and COLD SPRINGS,
AND
Other Parts of NATURAL HISTORY;
OR, TO THE
BUILDINGS, MANUFACTURES, INVENTIONS,
and DISCOVERIES of its Inhabitants.

The Whole collected from the Writings of the beſt HISTORIANS, TRAVELLERS, GEOGRAPHERS, and PHILOSOPHERS, among which are ſome *Original Manuſcripts*; interſperſed with pious OBSERVATIONS and REFLECTIONS; illuſtrated with NOTES, and adorned with COPPER-PLATES.

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BRITISH MUSEUM

THE

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THE

THE WONDERS OF NATURE AND ART.

CHAP. IV.

Of ITALY.

Mountains, Caves, Springs, &c.

WE cannot enter Italy by land without croſſing over a prodigious chain of high mountains called the Alps, which ſeparate this country from France and Germany, but even amongſt the perpetual ice and ſnow, and the rocks and precipices of theſe deſolate regions, there is ſomething pleaſing to a curious obſerver of the works of nature. Theſe mountains give riſe to the Rhine, the Rhone, and many other conſiderable rivers, ſome of which, before they get into the plains, fall down ſteep rocks with prodigious violence and noiſe. The roads which are cut along the ſides of vaſt precipices, and in ſeveral places very narrow, with monſtrous rocks impending over head, and the river roaring at the bottom, afford a ſcene that few travellers can behold without ſome degree of terror. But though the proſpect of this ſtupendous pile of rugged mountains, inacceſſible rocks, and wide chaſms by which they are interſected, ſeems to carry the face of ruin and confuſion, yet there is ſomething in the whole that is auguſt and ſtately, that fills the mind with noble thoughts, and naturally leads us to reflect on the power and majeſty of the great Creator *.

AMONGST the natural wonders of the Alps, the Glacieres, (as they are called) or Valleys of Ice, ſeem particularly to deſerve our notice; and a deſcription of one of them may ſuffice to give the reader an idea of the reſt. But it is to be obſerved, that though we call them valleys, as being

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* Dr. Derham obſerves, that mountains are ſo far from being a deformity to the earth, or a work without deſign, (as ſome are of opinion) that they are a noble, uſeful, and even neceſſary part of our globe. As to the buſineſs of ornament, beauty, and pleaſure, he appeals to the ſenſes of mankind, whether the grateful variety of hills and dales be not more pleaſing than the largeſt continued plains. But be the caſe as it will with regard to beauty, which is the leaſt valuable conſideration, this configuration of the earth is far the moſt commodious on ſeveral accounts.—The uſes of mountains are numerous, of which we ſhall only mention a few. 1. They ſerve, ſays Mr. Ray, as ſkreens to keep off the cold and nipping blaſts of the northerly and eaſterly winds. 2. They ſerve for the production of different ſpecies of vegetables, eſpecially thoſe for medicinal uſes. 3. It is to the hills, as Dr. Derham takes notice, that fountains chiefly owe their riſe, and rivers their conveyance. The origin of ſprings indeed is much controverted and variouſly accounted for by philoſophers; but whether they proceed from condenſed vapours, as ſome think, or from rains falling, as others; or are derived from the ſea by way of attraction, percolation, or diſtillation; or whether all theſe cauſes concur, or only ſome, ſtill the mountains, whoſe vaſt maſſes and ridges ſerve as ſo many huge alembicks, are the grand agent in this noble work of nature.

vaſt cavities or hollows, their ſituation is perhaps two or three thouſand feet perpendicular above the level of the plains below, and yet having points of rocks and mountains ſhooting up to a prodigious height above them. The aſcent to them is generally very ſteep, rugged, and ſlippery; and the air ſo extremely cold, that perſons who viſit them in July and Auguſt, the only months in the year that are fit for the journey, go cloathed as in the depth of winter. One of the moſt remarkable of theſe frozen valleys is that which takes its name from Chamony, a little village on the north ſide of the Arva, though the icy valley is on the ſouth; from whence it ſtretches itſelf near eighteen miles in length, being divided, at about half that diſtance from the village, into two different horns or branches. The ſurface of this valley is very uneven, appearing like a ſea or lake that has been agitated by violent winds and frozen all at once, whilſt the waves were rolling and daſhing one againſt another; and in ſeveral places there are great cracks in the ice, ſome narrow enough to ſtep over, but others ſome yards wide, in which people are often loſt who go in ſearch of cryſtal, for it is very dangerous going over them, eſpecially when covered with ſnow. Theſe cracks are made by the heat of the ſun at noon, and with ſuch a terrible noiſe, occaſioned by the echo from the rocks all round it, that it reſembles the firing of great guns, or loud claps of thunder. The breadth of this valley is about two miles, and the thickneſs of the ice in ſummer is found to be ſix or eight feet, but ſome of the frozen waves (if we may ſo call them) are forty or fifty feet higher than the cavities between them. According to Mr. Martel, who viſited this Glaciere in 1742, it has a communication with the valley of Chamony by five openings, at one of which the river Arbairon has its ſource, iſſuing from under two arches of ice, compoſed of a vaſt number of vertical ſhoots unequally terminated, which look like the fineſt cryſtal in the world, and reflect an infinity of the brighteſt colours. The Arbairon is a large ſtream that falls into the Arva, carrying along with it a great many particles of gold; and the rivulet of Argentiere, which comes from a Glaciere of the ſame name, carries with it alſo pieces of gold and ſilver.

THE Avalanches, or ſnow-balls, which ſometimes gather and roll down the ſides of theſe mountains, are very ſurprizing and dangerous to travellers. They are occaſioned by the dropping of a quantity of ſnow from ſome prominent rock, which increaſes as it falls down the ſteep declivities, till it becomes of a prodigious ſize, and ſweeps away houſes, trees, men, horſes, or whatever it meets with in its paſſage. As they fall ſuddenly, and with great rapidity, it is very difficult for paſſengers to avoid them; and nothing is able to reſiſt their force till they get to the bottom, where they generally break in pieces by the violence of the ſhock. Some of theſe mountain ſnow-balls have been found, by meaſuring their track, to be above a hundred yards in diameter; and one of them, in the year 1695, fell upon a village in the night-time, and deſtroyed eleven houſes, beſides barns and ſtables, burying men, women, and cattle in the ruins. Theſe terrible accidents, we are told, are produced even by the leaping of a chamois, the firing of a piſtol, a ſhout, the bells of mules and pack-horſes, or any noiſe that ſhakes the air, whereby the ſnow is looſened from the rocks above;

bove: for which reaſon, in places of the greateſt danger, people take care to travel early, and with all the ſilence poſſible. Some of theſe Avalanches indeed are not ſo deſtructive, which conſiſt of new-fallen ſnow driven by the wind; for theſe being lighter, perſons buried under them may live a long time without being ſuffocated, and are often timely relieved by men kept in pay to clear the roads, and give aſſiſtance to paſſengers on ſuch occaſions.

THE manner of croſſing the Alps is in ſome places extremely ſuprizing: the inhabitants of mount Cennis, who run up ſteep acclivities, loaded with the moſt heavy burdens, without ſuffering the leaſt inconvenience, carry a perſon directly up a mountain, whoſe height is a good hour's journey, without panting or reſting. And then, on the plain above, proceed with amazing diſpatch. They then having refitted the chairs, which is done in a few minutes, carry the company over the worſt part of the way, for two hours together, making only four pauſes, and thoſe very ſhort ones: ſuch is the effect of cuſtom, and of the ſimple diet, to which they owe their uncommon longevity, many of them attaining to above an hundred years of age. Milk is their uſual food, and they ſeldom taſte any wine. The better to ſecure their footing, their ſhoes are without heels, and the ſoles rubbed with wax and rozin. The machines in which they are carried, are a kind of ſtraw chairs, with low backs, two arms, and inſtead of feet, a little board hanging down by cords, for reſting the traveller's legs. The ſeat, which is made of bark and ropes, twiſted together, is faſtened to two poles, and carried like a ſedan, with broad leathern ſtraps.

DURING winter, the plain on the top of mount Cennis being always covered with ſnow, is croſſed in ſledges, drawn by a horſe or mule. In ſome places, the deſcent is performed in chairs; but from mount Cennis to Laneburg, it is conducted in a moſt ſurprizing manner. On the edge of the declivity is a houſe, where the traveller getting into a ſledge with his guide, ſlides down with ſuch rapidity, that he is carried about three miles in ſeven or eight minutes, the ſwiftneſs of the motion almoſt taking away his breath. The guide ſits forward ſteering with a ſtick, and has on each ſide an iron chain, which he drops like an anchor, either to ſlacken or ſtop the courſe of the ſledge.

IN ſome of theſe mountains the river Arva runs for many miles between high, craggy, and inacceſſible rocks, which ſeem as if ſplit on purpoſe, to give its rapid waters a free paſſage. The aſtoniſhing echos and continual ſounds occaſioned by its ſtreams, the trampling of the horſes and mules, and the hallowing of paſſengers, in theſe places are reverberated three, four, and even in ſome parts, ſix or ſeven times, with ſuch amazing loudneſs, as fills the traveller unaccuſtomed to them with terror; and the firing of a gun or piſtol, is here more dreadful than the loudeſt claps of thunder. The roads which are cut along the ſides of the ſteep rocks, and are frequently not above five or ſix feet wide, afford, both above and below, the dreadful proſpect of a ſteep precipice, with impending monſtrous rocks that appear juſt ready to fall, which, joined to the above noiſes, ſtrikes the amazed beholder with horror. The great cataracts of that river are, in ſeveral places, more or leſs loud and terrible, according as the waters are more or leſs ſwelled by the melting ſnows, with which the tops of the mountains are covered. One in particular falls with great noiſe and violence from a prodigious high rock, above eleven hundred feet.

THE Alps are generally allowed to be the higheſt mountains in Europe, not only from barometrical obſervations, but becauſe they give riſe to thoſe rivers which water all the countries around them; and perhaps they may vie in height with moſt of the conſiderable mountains in other parts of the globe. The Joch, a high mountain in the territory of Engelberg, where it borders upon the canton of Bern, has been found by the falling of the mercury in the barometer *, according to Dr. Scheuchzer's calculation, to be 5926 feet above the level of the ſea: and yet this is far from being the higheſt mountain in that neighbourhood,

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* The barometer is a machine for meaſuring the weight of the atmoſphere, and to ſhew the variations therein, in order chiefly to determine the changes of weather. This machine is founded on the Torricellian experiment, as it is called from its inventor Torricelli: it is a glaſs tube filled with mercury, hermetically ſealed at one end, and having the open end immerged in a veſſel of ſtagnant mercury. Now the mercury in the tube being ſuſtained by the preſſure of the atmoſphere on the ſurface of the ſtagnant mercury, it follows, that as the weight of the atmoſphere diminiſhes, the mercury in the tube will deſcend; and on the contrary, as it increaſes, the mercury will again aſcend; the column of mercury ſuſpended in the tube being always equal to the weight of the incumbent atmoſphere. Hence we have a curious method of meaſuring the height of mountains, the atmoſphere growing lighter, and conſequently the mercury ſinking in the tube, in proportion to the height aſcended. From theſe principles, ſupported by obſervations and experiments, ſeveral learned men have attempted to derive proper tables, by which the altitude of any place may be determined if the height of the mercury be given, or the height of the mercury

hood, for next to it riſes another called Titliſberg, covered with perpetual ſnow, which is at leaſt a thouſand feet higher than the Joch, and indeed one of the higheſt in the country.—The Gemmi is a very lofty mountain, over which there is a paſſage, but only in the ſummer, from the canton of Bern to Leuck in Valeſia. The deſcent on the ſouth ſide of this mountain is ſteep and frightful beyond deſcription, being a narrow path cut on the ſide of almoſt perpendicular precipices, and ſometimes we croſs over the clefts in the rocks on planks or quivering wooden bridges. The height of this mountain, at a cottage called Zur Dauben, a reſting place for weary travellers, appears by the barometer to be 6012 feet, being the higheſt part of it that is paſſable.—As to the Avicula, the St. Gothard, the Furea, the Grimſula, the Criſpalt, and a long chain of other mountains, which begin in the upper Valais, traverſe the canton of Uri, and ſo run acroſs the country of the Griſons towards Tyrol, their greateſt height above the level of the ſea may be fixed in round numbers at 7500 or 8000 feet. But the higheſt of all the mountains of Switzerland (ſays Dr. Scheuchzer) is the Stella, or Piz Stail, in the country of the Griſons, the perpendicular

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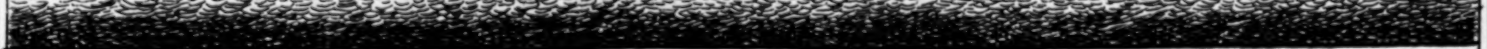
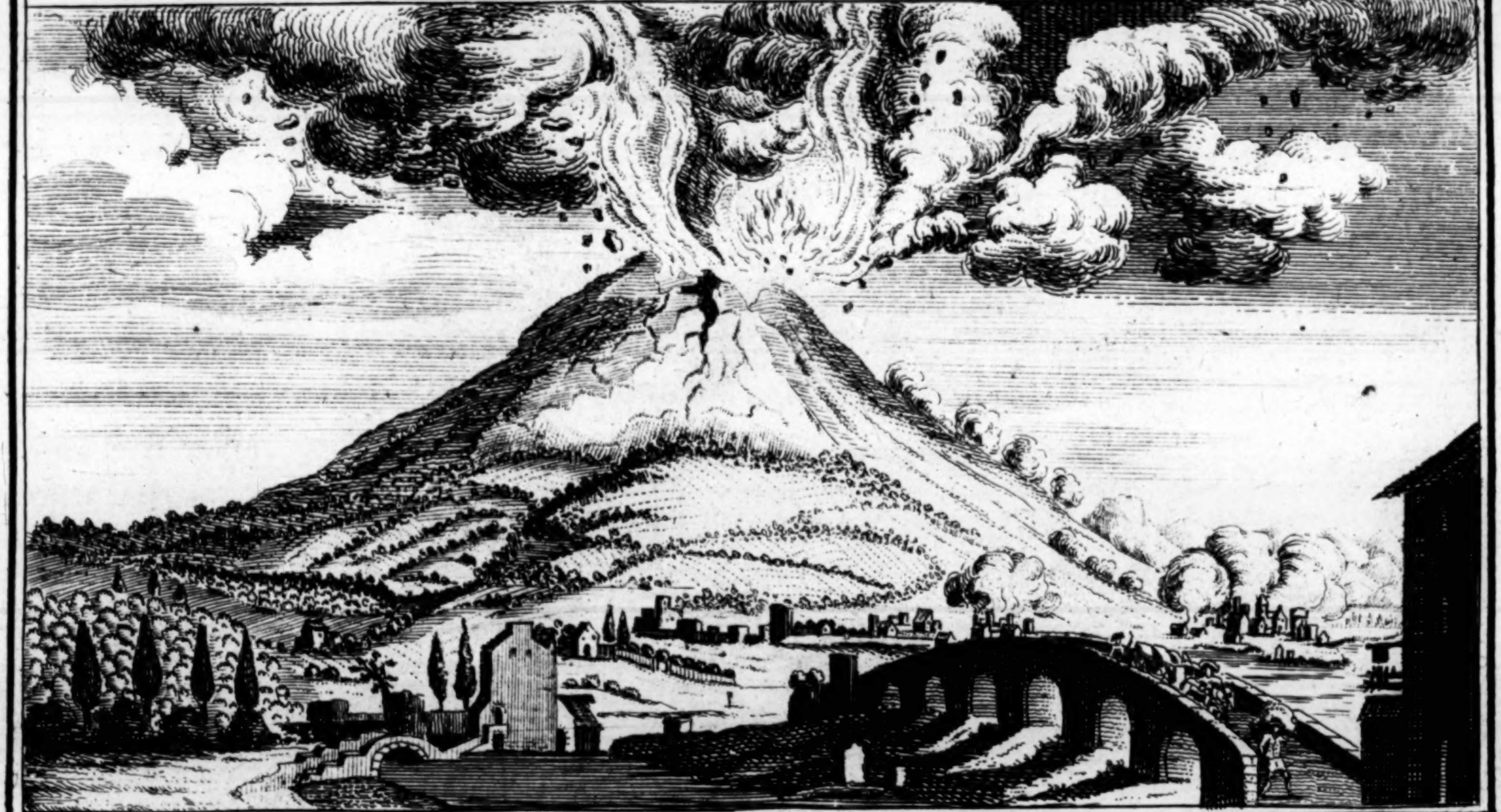
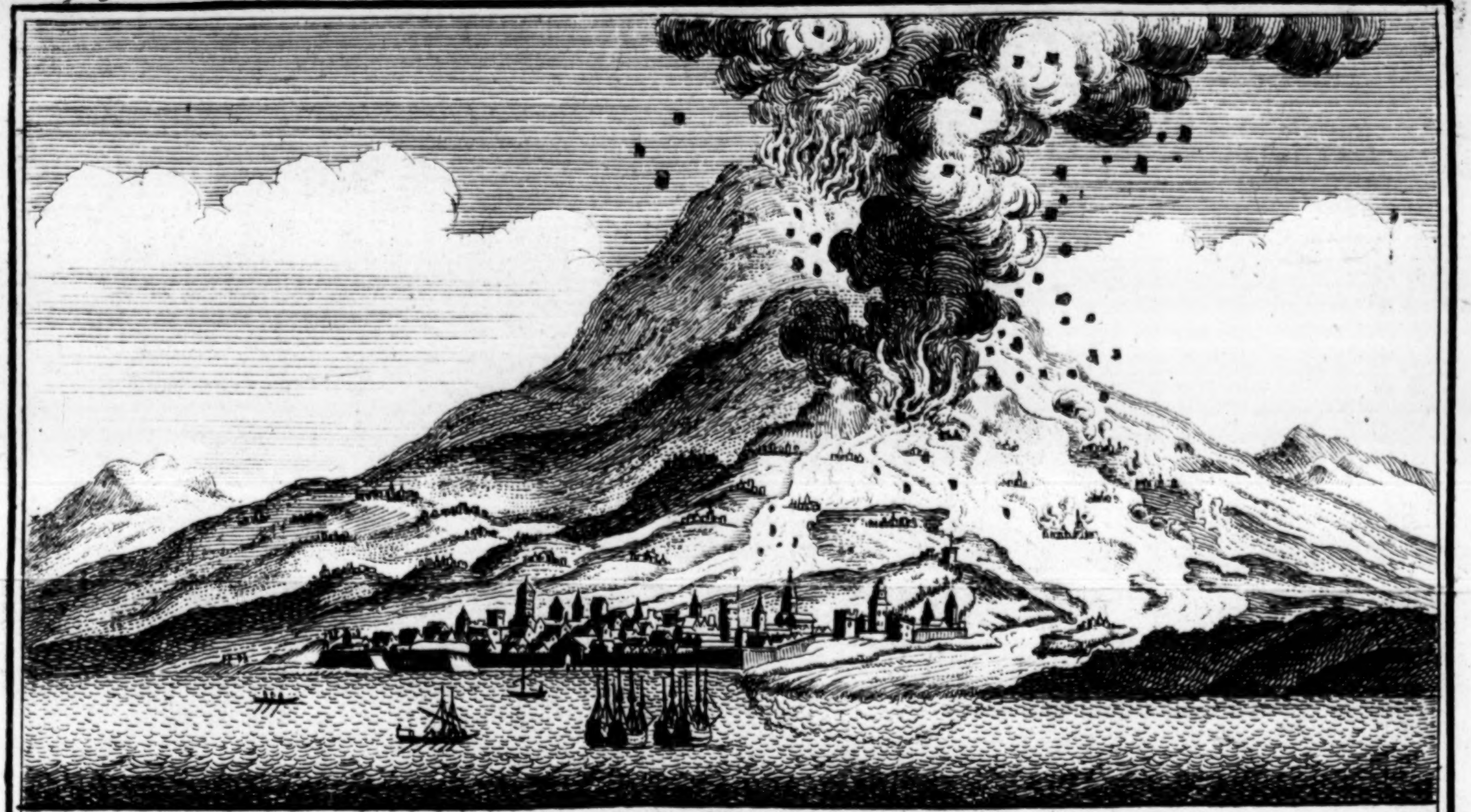
mercury from the given altitude of the place; and the expanſions of the air likewiſe ſettled, as they anſwer to every inch or part of an inch in the barometer. Mr. Derham, obſerving very nicely the variation of the mercury from the bottom to the top of the Monument, found that at the height of 82 feet it fell one tenth of an inch, and two tenths at 164 feet; and repeating the ſame experiment, his obſervations agreed exactly with the firſt trial. At the top of Snowdon Hill in Wales, which is 1240 yards high, Dr. Halley found the mercury three inches eight tenths lower than at the bottom of the mountain.



Mount Etna or Mongibello in Sicily being a true Draught of ye Eruption in 1669.



Mont Vesuvius two Leagues from Naples.



Mount Etna or Mongibello in Sicily being a true Draught of y^{e} Eruption in 1669.

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dicular height whereof, according to the Doctor's obſervations, is 9585 feet, or 12196 according to Caſſini; a height which the Chamois themſelves ſcarce venture to aſcend.—Whether Dr. Scheuchzer has taken notice of the higheſt of the Alps, we ſhall not pretend to determine; but it is worth obſerving, that Mr. Martel, when he viſited the Glacieres of Savoy, calculated the height of Mont Blanc (which he ſeems to think the loftieſt of all the Alps) to be 12459 feet above the level of the Rhone at Geneva. Theſe ſtupendous mountains are however far inferior in height to the Andes, as will be ſhewn in treating of America.

After this account of the Alps, it would be needleſs to ſay any thing of the Apennines, another chain of lofty mountains which run through the whole length of Italy; and therefore we proceed to take a view of mount Veſuvius, one of the moſt famous and dreadful Volcanos in the world. This burning mountain is ſeven or eight miles to the eaſtward of Naples, and the terrible eruptions of fire, ſtones, and melted matter that have proceeded from its ſummit, have often threatened the deſtruction of that city and all the neighbouring country. About half the way to it from Naples the road is pleaſant enough, running through ſeveral pretty villages along the coaſt: after which we meet with diſmal marks of this Volcano's fury. The aſcent to the top of the mountain is tedious and difficult, for every ſtep a perſon takes he ſinks into a kind of burnt earth, looſe and crumbled as if it had been ſifted, and mixed with calcined ſtones and cinders. Having travelled in this troubleſome manner about two miles, we arrive at a naked plain, from ſeveral parts whereof iſſues a ſulphureous ſmoke; and in the middle of it riſes another hill, ſhaped like a ſugar-loaf, of more difficult aſcent than the former. At the ſummit of this hill is a vaſt mouth or cavity, about four hundred yards in diameter at the top, but ſhelving down on all ſides like a funnel, from whence proceeds a continual ſmoke, and ſometimes thoſe aſtoniſhing eruptions of flame, aſhes, and burning matter, which fill the neighbouring inhabitants with conſternation. Every time it darts forth its flames, and pours forth its liquid matter, the exterior form of the mountain, as well as its height, receive conſiderable alterations. In a ſmall plain, reſembling a half moon, ſituated between the mountain of cinders, and a ſemicircular theatre of ſteep rocks, two hundred feet high; M. de la Condamine viewed cloſely the breathing holes, lately opened in the ſides of the mountain, through which, at the time of a late eruption, thoſe torrents of enflamed matter had eſcaped, to which they give the name of Lava, and with which all this valley is filled. This ſingular ſpectacle preſents us, ſays he, with the appearance of metallic waves grown cold, and in a ſtate of congelation. One may form a ſlight but very imperfect notion of it, by ſuppoſing to ourſelves a ſea of thick and tenacious matter, the waves of which were beginning to ſubſide. This ſea had its iſles, which are ſolitary maſſes, reſembling hollow ſpungy rocks, opening into arcades and grottos, fantaſtically formed, beneath which the burning liquid matter had opened itſelf magazines or reſervoirs not unlike furnaces. Theſe grottos, with their vaults, and pillars, all the pure work of nature, were loaded with Scoria, ſuſpended around them, in the form of Stalactites, or irregular cluſters of grapes of all ſorts of colours and ſhades.

If we look into ancient hiſtory, we find diſmal accounts of the devaſtations occaſioned by this Volcano; but we need go no farther back than the laſt century, nor even ſo far, for inſtances of its raging with extraordinary fury. In the year 1694 there was a violent eruption, which continued great part of the month of April, and threw up aſhes, ſtones, &c. with ſuch force, that ſome of them reached Benevento, near thirty miles diſtant. A prodigious quantity of melted minerals was likewiſe thrown out of the mouth, and ran ſlowly down the ſides of the mountain, inſomuch that great numbers of men were employed to cut trenches and channels to receive it, and prevent its ſpreading over the plains below. At this time, when the wind was in the eaſt, the houſes and ſtreets of Naples were covered with aſhes.

The latter end of July, in the year 1707, there happened another terrible eruption, attended with ſuch a rumbling and bellowing of the mountain, as far exceeded the report of the largeſt artillery. Having thrown up clouds of aſhes into the air for ſeveral days and nights, and a ſhower of ſtones that killed both men and cattle, it began to belch out a liquid torrent of bitumen, which reſembled a gentle ſtream of fire, and cooling in its progreſs became as hard as flint at the bottom, but more porous and ſpongy on the ſurface. After this, frequent flaſhes of fire, like lightning, proceeded from its mouth, followed by loud claps of thunder; and on the ſecond of Auguſt, at four in the afternoon, there was ſuch a thick cloud of aſhes hovering over Naples, that the darkneſs was equal to that at midnight. The next day, by the ſhifting of the wind, the aſhes were driven another way; and the mountain having raged after this manner about fifteen days, the eruption entirely ceaſed.

To theſe accounts of Veſuvius we ſhall only add a few particulars relating to the great eruption in 1717, as they are given us by Mr. Edward Berkeley, afterwards biſhop of Clogher, in Ireland, who was then at Naples. On the 5th of June, he tells us, the mountain was obſerved to ſpue a little out of the Crater, as he calls its mouth; and the ſame continued the day following. The 7th in the evening it began a hideous bellowing, which continued till noon the next day, cauſing the windows and even the houſes in Naples to ſhake. From that time it would vomit vaſt quantities of melted matter to the ſouth, which ſtreamed down the ſide of the mountain, like a pot boiling over. On the 10th it roared and groaned moſt dreadfully, of which one cannot form a juſter idea, than by imagining a mixed ſound made up of the raging of a tempeſt, the murmur of a troubled ſea, and the roaring of thunder and artillery confuſed all together. This induced our author, with three or four more in company, to viſit the mountain; and they arrived at the burning river about midnight, when the roaring of the Volcano was exceeding loud and horrible. There was a mixture of colours in the cloud over the Crater, a ruddy diſmal light in the air over the fiery torrent, and aſhes were continually ſhowering upon their heads; all which circumſtances, augmented by the horror and ſilence of the night, made a moſt uncommon and aſtoniſhing ſcene. Imagine, ſays he, a vaſt torrent of liquid fire rolling along the ſide of a mountain, and with incredible fury bearing down and conſuming vines, olives, fig-trees, houſes, and every thing that ſtood in its way. The largeſt ſtream,

ſtream ſeemed half a mile broad at leaſt, and five miles long; and Mr. Berkeley walked ſo far up the mountain by the ſide of this burning river, that he was obliged to retire in haſte, the ſulphureous ſteam having ſurprized him, and almoſt taken away his breath. They returned about three in the morning, hearing conſtantly the murmur and groaning of the mountain, which now and then burſt into louder peals, throwing up huge ſpouts of fire and burning ſtones, which in their fall reſembled the ſtars in our rockets. Sometimes there appeared two or three diſtinct columns of flame, and ſometimes only a ſingle one that ſeemed to fill the whole Crater. It was judged that the flames and fiery ſtones were ſhot more than a thouſand feet perpendicular above the ſummit of the Volcano; which continued raging in this manner, more or leſs, till the 18th, when the whole appearance ended, and the mountain remained perfectly quiet.

By one of the ancient eruptions of this mountain, in the reign of Titus, the city of Herculaneum was overwhelmed by a ſtream of the Lava. Upon digging in thoſe parts in the year 1689, and 1711, ſome remains of that unfortunate city was diſcovered; but ſince the year 1738, farther ſearches having been made, at a conſiderable expence, ſtately buildings have been found; and from among the rubbiſh, have been taken a multiplicity of invaluable antiquities, as paintings, ſtatues, buſtos, books, furniture, and various utenſils.

Mr. Keyſler obſerves, that though mount Veſuvius often fills the neighbouring country with terror, yet as few things in nature are ſo abſolutely noxious as not to produce ſome good, even this raging Volcano, by its ſulphureous and nitrous manure, and the heat of its ſubterraneous fire, contributes not a little to the uncommon fertility of the country about it, and the profuſion of fruit, herbage, &c. with which it is every where covered. Thoſe are obſerved to be the moſt fertile ſpots which abound in ſulphur, ſalt-petre, &c. and if ſuch igneous and inflammable ſubſtances were pent up, their fermentations and ebullition would be productive of the moſt calamitous effects; whereas they find a vent through theſe Volcanos. Experience ſhews, that earthquakes, after any continued eruptions of Veſuvius, are neither ſo frequent, nor produce ſuch fatal effects, as at other times. Hence the inhabitants are far from being alarmed at this mountain's vernal eruptions, when they are not violent; and the air is ſo far from being rendered unhealthy by them, that Barra, a village at the foot of Veſuvius, near the ſea, is remarkable for its healthfulneſs. To theſe advantages it may be added, that M. de la Condamine obſerves, that the above Lava, or liquid matter, on its cooling, forms ſolid maſſes, ſurpaſſing in hardneſs, even that of marble; whence tables, chimney pieces, and even ſnuff-boxes are made of it. With this matter the city of Naples is paved; the pavement of Rome is alſo compoſed of the ſame materials, as are likewiſe a great part of the ancient Roman highways.

HAVING been ſo particular in deſcribing ſeveral eruptions of Veſuvius, we need ſay the leſs concerning mount Ætna, another famous Volcano in the iſland of Sicily, which yet muſt not be paſſed by in ſilence. There are many furious eruptions of this mountain recorded in hiſtory, ſome of which have proved very fatal to its neighbourhood; but we ſhall only take notice of that which happened in 1669, as it is deſcribed in the

Philoſophical Tranſactions. It firſt broke out on the 11th of March, two hours before night, on the ſouth-eaſt ſide of the mountain, about twenty miles from the old mouth, and ten from the city of Catanea. The noiſe of the eruption was heard a hundred miles off, to which diſtance the aſhes were likewiſe carried. The matter thrown out was a ſtream of metal and minerals, rendered liquid by the fierceneſs of the fire, which boiled up at the mouth like water at the head of a great river; and having run a little way, the extremity thereof began to cruſt and curdle, turning into hard porous ſtones called Sciarri, reſembling large cakes of burning ſea-coal. Theſe came rolling and tumbling one over another, bearing down any common building by their weight, and burning whatever was combuſtible. At firſt the progreſs of this inundation was at the rate of three miles in twenty-four hours, but afterwards it ſcarce advanced a furlong in a day; and thus it continued for fifteen or twenty days together, running into the ſea cloſe by the walls of Catanea. At length it made its way over the walls into the city, where however it did no conſiderable damage, except to a convent of Benedictines. In its courſe it overwhelmed fourteen towns and villages, containing three or four thouſand inhabitants; and it is remarkable, that during the whole time of this eruption, which was fifty-four days, neither ſun nor ſtars appeared.

But though Catanea had this time the good fortune to eſcape the threatened deſtruction, it was almoſt totally ruined in 1692-3 by an earthquake, one of the moſt terrible in all hiſtory. It was not only felt all over Sicily, but likewiſe in Naples and Malta; and the ſhock was ſo violent that people could not ſtand upon their legs, and thoſe who lay upon the ground were toſſed from ſide to ſide, as if upon a rolling billow. The earth opened in ſeveral places, throwing up large quantities of water; and great numbers periſhed in their houſes by the fall of rocks that were looſened and rent from the mountains. The ſea was violently agitated and roared dreadfully, mount Ætna threw up vaſt ſpires of flame, and the ſhock was attended with a noiſe exceeding the loudeſt claps of thunder. Fifty-four cities and towns, with an incredible number of villages, were either deſtroyed or greatly damaged; and it was computed that near 60,000 people periſhed in different parts of the iſland, of whom 18,000 were inhabitants of Catanea, very few eſcaping the general and ſudden deſtruction of that city *. But to return to Italy.

We are informed by Dr. St. Clair, in the Philoſophical Tranſactions, that on the ſide of one of

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* Earthquakes are certainly the moſt formidable phænomena in nature, but with reſpect to their cauſes, naturaliſts are divided, ſome aſcribing them to water, others to fire, and others to air; and all of them with ſome reaſon, though fire ſeems to be the chief, for thoſe countries which have the greateſt ſtore of ſulphur and other inflammable matters are moſt ſubject to earthquakes. Dr. Liſter is of opinion, that the material cauſe of thunder, lightning, and earthquakes is one and the ſame, viz. the inflammable breath of the Pyrites, which is a ſubſtantial ſulphur and takes fire of itſelf. Dr. Woodward, who aſcribes earthquakes to the ſubterraneous heat or fire rarefying and ſwelling the waters of the abyſs till it can find a vent, obſerves, that the effects of theſe commotions are not very remarkable except in countries that are mountainous, and conſequently ſtony and cavernous underneath, ſince the fire naturally tends to thoſe caverns where it meets with the readieſt reception, and the ſtrata of ſtone or marble making great oppoſition, the ſhocks are more violent and the effects more terrible, than when they happen amongſt

of the Apennines, between Florence and Bologna, there is a ſpot of ground three or four miles in diameter, from whence iſſues a conſtant flame, which riſes very high and gives a great heat, but without noiſe, ſmoke, or ſmell. In laſting and heavy rains it ſometimes intermits, but rekindles with greater heat and vigour. The Doctor adds, that corn grows within a few yards of it; and he conjectures the flame ariſes from a vein of Bitumen or Naptha. There are other fires of this kind upon the ſame mountains.

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amongſt gravel, ſand, or ſuch looſe matter as makes little reſiſtance. Hence it is that Italy, Sicily, &c. are ſo often alarmed and harraſſed with earthquakes, thoſe countries being mountainous and cavernous, abounding with ſtone and marble, and affording ſulphur and nitre in great plenty.—The ſame ingenious author adds, that Ætna, Veſuvius, and other Volcanos, are only ſo many ſpiracles, ſerving to diſcharge the ſubterraneous fire when preternaturally aſſembled; and that if this fire can come at theſe ſpiracles without any obſtruction, it eaſily paſſes out from time to time without ſhaking or diſturbing the earth; but when a communication is wanting, or not ſufficiently large, it heaves and ſhakes the earth till it has made its way to the mouth of the Volcano. He farther obſerves, there is ſcarce any country much annoyed with earthquakes that has not one of theſe fiery vents; which when an earthquake happens is conſtantly in flames, diſgorging that fire, which, whilſt underneath, was the cauſe of the diſaſter. So that the countries that have theſe Volcanos, tho' they are troubled with earthquakes, would ſuffer much more from them if ſuch ſpiracles were wanting, and the fire ſhould continue impriſoned in the bowels of the earth.—To illuſtrate the proceſs of nature in the production of earthquakes, it may not be amiſs to take notice, that artificial ones may be made by mixing twenty pounds of iron filings with an equal quantity of ſulphur, and tempering the whole together with a little water, ſo as to form a maſs half dry, half moiſt. This being buried three or four feet in the ground will produce ſurprizing effects in ſix or ſeven hours time; for the earth will begin to tremble, crack, and ſmoke, and at laſt ſend forth fire and flame, ſo as to reſemble (if the quantity of matter were ſufficient) a natural Volcano.

The Solfatara, near Pozzuoli in the kingdom of Naples, is a remarkable hill, on which there is a cavity of an oval form, from ſeveral parts whereof iſſues a thick ſmoke, or ſteam, and ſometimes flame. The ſurface of the ground is always very warm, and in ſummer-time is covered with a ſaltiſh flour or duſt, which they ſweep together, and put into coppers filled with water, and placed over certain ſubterraneous ſpiracles, the heat whereof, without any other fire, evaporates the water, and leaves an alum behind.—It is ſaid that by an earthquake, which happened in the year 1538, a vaſt quantity of earth and aſhes was thrown up from the Solfatara, which formed about three miles from thence a high hill, called Monte Novo, or the New Mountain, upon the ruins of a town overwhelmed by that eruption.

We have ſaid enough, or perhaps too much, upon the ſubject of burning mountains, and therefore proceed to deſcribe ſome of the moſt remarkable caves or grottos to be found in Italy. About two miles from Naples, juſt by the lake of Agnano, is a famous little cave called Grotta del Cani, (from the frequent experiments made there on dogs) the bottom of which is covered with a thin ſuffocating vapour, viſible enough to a diſcerning eye. The ſides of the grotto, as high as the vapour reaches, (which is about a foot) are of a greeniſh colour; and above this mark the air is not in the leaſt offenſive or injurious: but if a dog, or other animal, be forcibly kept below it, the noxious fume preſently throws him into convulſions, and in a few minutes ſcarce any ſigns of life appear. However, if the creature is taken out in time, and laid in the open air, he ſoon recovers, and ſooner if thrown into the adjacent lake *.

lake *.——This vapour is of ſuch a nature that gun-powder will not take fire in it; and it extinguiſhes lighted candles, flambeaux, or matches.

NEAR the village of Saſſa, about eight miles from Bracciano, is another little cave called Grotta del Serpi, or the Grotto of Serpents, which Kircher ſays, is big enough to hold two perſons, and is perforated with a great many fiſtular apertures, almoſt like a ſieve; out of which, at the beginning of the ſpring, iſſue a vaſt number of young ſnakes of divers colours, but not endued with any particular poiſonous quality. In this cave perſons afflicted with an elephantiaſis, leproſy, palſy, gout, &c. are expoſed naked, where a ſweat being raiſed by the warmth of the ſubterraneous ſteams, and the ſerpents clinging all round them, licking and ſucking the parts affected, they are freed from their vicious humours, and by continuing this practice for ſome time the diſtemper is entirely removed †. Kircher viſited the grotto himſelf, found it warm, and heard a hiſſing noiſe in the holes; and though he did not ſee the ſerpents, it not being the ſeaſon of their creeping

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* The lake of Agnano, as Dr. Mead obſerves, has no virtue in it more than others to produce this effect; but the recovery of the animal is owing to the coldneſs of the water, which promotes the contraction of the fibres, and ſo aſſiſts the retarded circulation.——The Doctor is of opinion that the fumes of this grotto are no real poiſon, but act chiefly by their gravity. Or perhaps all the phænomena may be accounted for, as Mr. Addiſon ſuppoſes, by allowing the vapour to have a glutinous or viſcous quality.

† It is ſaid this cave was accidentally diſcovered by a Leper, who was going from Rome to ſome baths thereabouts, and loſing his way, and being benighted, happened to creep into it for a lodging. Finding it very warm, he pulled off his cloaths, and being weary and ſleepy, had the good fortune not to feel the ſerpents about him till they had wrought his cure.

out, he ſaw ſeveral of their exuviæ or ſloughs in the grotto, and abundance of them hanging upon a neighbouring elm.

WHAT is called the Grotto of Pauſilypo is a ſubterraneous paſſage cut through a hill of that name between Pozzuoli and Naples. It is above half a mile long*, twenty feet bread, and twice as high at each entrance, but grows lower by degrees, for the better admiſſion of the light. This road was anciently very dark and duſty, which inconveniences have been in ſome meaſure remedied by making openings at the top, and paving the bottom of it; but ſtill it is a troubleſome and tedious paſſage.

THE grotto or cave near the lake Averno, wherein the famous Cumæan Sibyl is ſaid to have delivered her oracles †, is an amazing work, being hewn

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* Biſhop Burnet ſays, its length is four hundred and forty paces, for he walked it on foot to take its true meaſure. He adds, that the ſtone dug out there is good for building; which makes it probable, that this cave was not orignally cut for a road, but was a quarry of ſtone.

† The Sibyls, among the antients, were virgins ſuppoſed to be divinely inſpired, who in the height of their enthuſiaſm gave oracles, and foretold things to come. Authors are not agreed about the number of Sibyls, ſome reckoning three, others four, and Varro ten; but the moſt celebrated were the Delphic, Erythræan, and Cumæan. The Sibylline oracles were held in great veneration, and the books wherein they were written were kept by the Romans with infinite care, nothing of moment being undertaken without conſulting them. When theſe propheteſſes received their pretended inſpirations, their looks grew wild, they were ſeized with violent tremblings, and all the ſymptoms of madneſs and diſtraction. Thus Virgil deſcribes the Cumæan Sibyl when receiving the divine Afflatus:

——Subito

hewn out of a hard rock. It is ſeven hundred feet long, twenty broad, and about eighteen high; and at the end of this great cave there is a narrow paſſage, two hundred feet in length and ſeven in height, which leads to a kind of apartment conſiſting of three little rooms, where we perceive ſome remains of moſaic work, and a fountain of clear water, wherein the Sibyl is ſuppoſed to have bathed herſelf. From hence (it is ſaid) the cave formerly ran quite to Cumæ, which is three long miles; but the paſſage is now choaked by the falling in of the rock in ſeveral places.—The marks of the chiſſel appear in all parts of this grotto, which ſhew that it is not a work of nature, any more than that of Pauſilypo; and therefore, though we have deſcribed them here, both theſe grottos properly belong to the antiquities of this country.

ONE of the moſt famous cataracts in Italy, at a diſtance from the Alps, is that called Caſcata del Marmore, from the mountain down which the Velino falls, being almoſt entirely of marble. It lies in the duchy of Spoletto in the road to Terni, from which it is about three miles diſtant. This

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——Subito non vultus, non color unus,
Non comptæ manſere comæ; ſed pectus anhelum,
Et rabie fera corda tument, majorque videri,
Nec mortale ſonans, afflata eſt numine quando
Jam propiore Dei———— ÆNEID, VI.

Her colour chang'd, her face was not the ſame,
And hollow groans from her deep ſpirit came;
Her hair ſtood up, convulſive rage poſſeſs'd
Her trembling limbs, and heav'd her lab'ring breaſt:
Greater than human kind ſhe ſeem'd to look,
And with an accent more than mortal ſpoke;
Her ſtaring eyes with ſparkling fury roll,
When all the God comes ruſhing on her ſoul.
DRYDEN.

road, which is on the ſide of the mountain, from which it is cut, is extremely dangerous from the ſlipperineſs of the rock, and the frightful height of the precipices; but on reaching the ſummit of the mountain, the traveller is ſufficiently rewarded by the view of this ſtupendous cataract, for the river, after running ſome miles with a gentle courſe, reaches the declivity of its channel, which is ſhaded with many thick trees, covered with perpetual verdure, as are the mountains by which this is ſurrounded, and then it proceeds with a very rapid courſe; till at laſt it ruſhes with impetuoſity down a ſteep rock, about three hundred feet high, falling on other rocks, againſt which the waters daſh and break, riſing in miſts, which after hovering ſome time in the air, far above the level of the cataract, fall in a kind of perpetual rain, down into the adjacent valley. After this fall, the waters ruſh into the cavities of the rocks, and then foaming, burſt through ſeveral openings; and after rolling for ſome time down other precipices, at laſt reach the bed of the river at the bottom. Mr. Smallet obſerves ſuch a body of water ruſhing down a mountain; the ſmoke, vapour, and thick white miſt which it raiſes; the double rainbow which theſe particles continually exhibit, while the ſun ſhines; the deafening ſound of the cataract; the vicinity of a great number of other ſtupendous rocks and precipices, with the daſhing, boiling, and foaming, of the furious rivers Nera and Velino below, produce all together an object of tremendous ſublimity: yet great part of its effect is loſt for want of a proper point of view from which it might be contemplated. The caſcade would appear much more aſtoniſhing, were it not in ſome meaſure eclipſed by the ſuperior height of the neighbouring mountains.

You have not a front perſpective, but are obliged to view it obliquely on one ſide, ſtanding upon the brink of a precipice which cannot be approached without horror.

It would be endleſs to take notice of all the medicinal ſprings in Italy and the neighbouring iſlands, or even of thoſe which are to be found in the kingdom of Naples alone. The country abounds with hot baths impregnated with ſulphur and other minerals, which are frequented for many diſtempers, eſpecially the gout, rheumatiſm, and venereal diſeaſes.—About a mile from Viterbo there are ſeveral ſprings on the ſide of a hill, which have a ſulphureous and brackiſh taſte, and the water is ſo hot as to harden eggs, or even to ſcald the hand, if not taken out preſently. They are ſurrounded with a low wall, and ſend out four ſtreams or rivulets into other receptacles, where the heat of the water is much abated. Dr. Breynius, who ſaw them, wondered that they were ſo much neglected; though he would not adviſe the taking them internally, on account of the great number of calcarious particles they contain.

In the duchy of Modena there are ſeveral ſprings or wells, from the ſurface of which is gathered a ſubtle, inflammable, mineral oil, of a fragrant bituminous ſmell, and of different colours. This is what we call Petroleum, oil of petre, or rock-oil, becauſe it frequently iſſues from the clefts of rocks, and the ſprings on which it floats are generally found on craggy mountains. Near a place in this duchy called Frumetto the inhabitants dig wells to come at theſe oily ſprings, and find in thoſe at the bottom of the hill a large quantity of red oil, but thoſe near the top yield a white oil as clear as water. There is another rock near the Apennines in the ſame country, from whence riſes a perpetual ſpring of water, on which this oil ſwims, and in ſuch quantities, that twice a week they gather ſix pounds at a time.

IN the ſea near the foot of mount Veſuvius, is alſo found Petroleum. During the time that it riſes, the ſurface of the ſea is, for a little ſpace, covered with its bubbles, which they ſkim off into their boats, and afterwards ſet to ſeparate in pots and jars; but its ſources are ſaid never to run but when the weather is warm and calm.

THE white tranſparent Petroleum is reckoned the beſt, next to that the yellow, then the red, but the black is accounted the moſt impure of all.—This oil is very warm and penetrating, and good in rheumatic and paralytic diſorders.

THE little lake near Tivoli, and the rivulet called Salforata that iſſues from it, are remarkable for their offenſive ſulphureous ſtench, which infects the air to a conſiderable diſtance. In the lake are ſeveral floating iſlands, fifteen or twenty yards long, ſuppoſed to be formed originally of ſulphureous earth riſing from the bottom; and the banks ſeem to have encroached upon the lake by an incruſtation of the ſame matter, which in time may probably cover its whole ſurface.

WE ſhall conclude this article with a curioſity in the iſland of Zant, belonging to the Venetians, which is a ſpring of freſh and clear water, that throws up pieces of real pitch, ſome as big as one's thumb, or even larger. Beſides this, when the water has ſtood to be thoroughly ſettled, a quantity of pitch is found at the bottom; and from this ſpring it is ſaid the people procure annually about a hundred barrels, with which they pitch their ſhips and other veſſels.

FOSSILS.

IN ſeveral parts of Italy, and ſome of the neighbouring iſlands, is found the Lapis Aſbeſtos, or Amianthus *, by us called Earth-Flax and Salamander's Wool, which is a ſort of fiſſile ſtone, or mineral ſubſtance, of a whitiſh colour and woolly texture, conſiſting of ſmall filaments, and endued with the wonderful property of reſiſting fire, and remaining unconſumed in the intenſeſt heat. The induſtry of mankind has found out a method of working this fibrous mineral, and employing it in divers manufactures, chiefly cloth and paper; though one would ſcarce imagine the thing practicable without the mixture of ſome other pliant matter, as wool, hemp, or flax, the threads of the Aſbeſtos appearing too brittle for ſuch uſes. The cloth made of this incombuſtible matter was in great eſteem amongſt the ancients, though better known and more common than in the preſent times. Pliny ſays, he himſelf had ſeen napkins of it, which being taken foul from the table, and thrown into the fire, were by that means cleanſed as if they had been waſhed in water: but the principal uſe of it, according to the ſame author, was to make ſhrouds to wrap up the

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* This ſtone is not peculiar to Italy, or the Mediterranean iſlands, but is found in India, Tartary, Siberia, Egypt, and Greece; likewiſe in France, the Netherlands, the iſle of Angleſey in Wales, in Scotland, Norway, and many other parts of the world.—Mr. Lloyd (Phil. Tranſ. No. 166) had ſome paper made of that found in the iſle of Angleſey, which proved coarſe and apt to tear; but being the firſt attempt, there was great reaſon to think it might be much improved: and yarn was made of that which Mr. Wilſon diſcovered in Scotland.

corps of Kings, &c. that ſo their aſhes might be preſerved diſtinct from thoſe of the fuel, which compoſed the funeral-pile; and it is ſaid the Tartars ſtill make uſe of it in burning their dead.—As to the art of managing the Aſbeſtos, and of ſpinning and weaving it, &c. the accounts we have are various. Signor Caſtagnata, ſuperintendant of ſome mines in Italy, found in one of them a great quantity of this lanuginous mineral, and had the ſkill of preparing it in ſuch a manner, as to reſemble a fine lamb-ſkin dreſſed white; and he could thicken or thin it to what degree he pleaſed, ſo as to become either like a very white ſkin, or a very white paper; both which would reſiſt the moſt violent fire, as he often experienced.—Signor Ciampini gives us the method of ſpinning the Aſbeſtos, and making it into cloth, which he thus effected. He firſt laid the ſtone to ſoak for ſome time in warm water, then opened it and divided it with his hands, that the earthy parts might fall out, which are whitiſh like chalk, and ſerve to bind the fibrous parts together. This operation he repeated ſix or ſeven times with freſh water, ſtill opening and ſqueezing the mineral till all the heterogeneous parts were waſhed out, and then the flax-like parts were laid in a ſieve to dry. One method of ſpinning the Aſbeſtos thus cleanſed is to card it gently, and then lay it between the cards, ſo that ſome of it may hang out of the ſides. Having faſtened the cards on a table or bench, take a ſmall reel made with a little hook at the end, and a part by which it may be eaſily turned round. This reel is to be wound over with white thread, and a ſmall veſſel muſt be in readineſs, with which the fore-finger and thumb are conſtantly to be kept moiſt, both to preſerve the ſkin, and to render the filaments of the ſtone more ſoft and pliant; and ſo by twiſting about the thread upon the reel with the Aſbeſtos hanging out of the cards, ſome of the latter will be worked up with it; and this thread may, with care, be woven into a coarſe ſort of cloth, which being put into the fire, the thread and oil will be conſumed, and the incombuſtible cloth remain. But this method being very tedious, inſtead of the thread it is better to put ſome flax on a diſtaff, and by taking three or four filaments of the ſtone and mixing them with the flax, they may be eaſily twiſted together, and the thread thus made will be more ſtrong and durable; ſo that carding is unneceſſary, and rather breaks the filaments than does any ſervice.—In waſhing the ſtone, the ſame gentleman obſerves, there will remain ſeveral ſhort pieces at the bottom of the water, of which paper may be made after the common method. He adds, that the beſt way to preſerve the cloth or any thing made of this mineral, which by reaſon of its dryneſs is very apt to break and waſte, is to keep it well oiled; and when the cloth is put in the fire, the oil burns off, and the cloth comes out white and purified *.

UNDER this article we ſhall place the Pumice-ſtone, which is frequent in Italy and Sicily, being thrown up by the eruptions of Veſuvius and Ætna. Naturaliſts indeed are not well agreed

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* It is a common opinion, that the Aſbeſtos loſes nothing of its weight in the fire; and this ſeems to be confirmed by what S. Ciampini tells us, that he kept it for three weeks in a glaſshouſe fire, and found it unaltered. But in two trials before the Royal Society, a piece of cloth made of this ſtone, a foot long, and half a foot broad, loſt each time above a dram of its weight. It is remarkable, that when taken out red-hot, it did not burn a piece of white paper on which it was laid.

about the nature and origin of pumice, ſome taking it to be pieces of rock half-burnt and calcined, and caſt into the ſea by Volcanoes, where being waſhed by the ſalt-water it acquires a whitiſh or greyiſh colour. Others will have it to riſe from the bottom of the ſea, whence they ſuppoſe it detached by ſubterranean fires; and hence they account for its ſaline taſte, its lightneſs and poroſity. In confirmation hereof they alſo alledge, that theſe ſtones are frequently found in parts of the ſea far remote from all Volcanoes; and add, that ſeveral parts of the Archipelago are ſometimes covered with them all on a ſudden, after a few inward ſhakes and heavings of the bottom *. —The pumice is of ſome uſe in medicine, but much more in the arts and manufactures.

In ſeveral of the Alps of Savoy, near the Glacieres, they dig from amongſt the rocks a ſpecies of cryſtal, which they diſcover by ſome veins that appear on the ſurface, and are commonly of a whitiſh and blueiſh colour. They break the rock, and find the cryſtal in cavities, perhaps ſeveral feet deep, which they call ovens. It is tranſparent, reſembling a diamond, but much inferior to it in hardneſs and luſtre. The ſhoots of it are of different lengths and bigneſs, but all of them hexagonal, and terminating in a point, the other end adhering to a ſort of irregular ſtone, which is ſtiled the Matrix of the cryſtal. The

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* Mr. Dove gives us an account in the Philoſophical Tranſactions, of a ſurprizing ſhoal of pumice-ſtones which he ſaw floating in the Ethiopic ocean, from the 22d to the 26th of March, during which time his ſhip ſailed above three hundred miles; and when he firſt diſcovered theſe ſtones, whereof ſome were as big as a man's head, he reckons they were 186 leagues from the neareſt land.

rocks ſometimes fall into the frozen vallies, where people find the cryſtal on the ſurface of the ice.

IN the Alps and Apennines they likewiſe dig up Talc, a ſort of ſhining ſtone, eaſily diviſible into thin tranſparent ſcales or leaves, a little flexible. Some talc is of a ſilver colour, and ſome yellow; but that we have from Venice is reckoned the beſt, which is brought to us in large greeniſh ſtones, but when wrought becomes white and exceedingly pellucid *.

THERE is found in the neighbourhood of Bologna, a grey, gloſſy, ponderous ſtone, about the ſize of a large walnut, which being properly prepared and calcined makes a ſpecies of phoſphorus. This was accidentally diſcovered by one Caſciarlo, a chymiſt, who having gathered ſome of theſe ſtones and carried them home, in hopes of extracting ſilver out of them by fire, found that after a certain proceſs, being expoſed to the light, they retained it in ſuch a manner, as to ſhine in the dark for a conſiderable time. Some affirm, that the true art of preparing and calcining this ſtone is loſt; and we are told of a perſon who had a method of making ſtatues and pictures of it, that would appear luminous in the dark, but that he died without diſcovering his ſecret †.

VEGE-

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* The Talc brought from Muſcovy is reddiſh when in the ſtone, but it ſeldom comes to us otherwiſe than in leaves, which are hard, ſmooth, gloſſy, and very tranſparent, whence it is called Muſcovy Glaſs, and is uſed for lanterns, to cover paintings, &c. The Lapis ſpecularis of Pliny is a ſpecies of Talc, which he obſerves the Romans uſed for window-lights, as they do now in ſome countries where it is found.

† It is to be obſerved, that the Bononian ſtone, though it reſembles a burning coal, never emits any heat; but the effects of the burning phoſphorus, which is a chymical preparation

VEGETABLES.

OF the vegetable productions of Italy, we know of none more remarkable than a kind of aſh-tree, growing chiefly in Calabria, from which, in the heat of ſummer, flows a white ſweetiſh juice or gum, called Manna, which is of great uſe in medicine, being one of the mildeſt and ſafeſt purgatives in nature. There are three kinds of this Calabrian Manna, one called Manna di Corpo, which is the fineſt of all, and is ſpontaneouſly diſcharged from the trunk and large branches of the tree, in form of a cryſtalline liquor, which is hardened into grains of different ſizes, and carefully gathered the ſucceeding day. The ſecond ſpecies, which the Italians call Manna forzata or forzatella, is obtained by making inciſions in the bark of the tree in Auguſt, after the natural diſcharge ceaſes. From theſe inciſions the Manna flows copiouſly from noon till towards

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ration made of ſand and urine, are very ſurprizing. With a piece of ſolid phoſphorus one may write on paper, plaiſter, &c. and the letters in the dark will appear like flame, but when a candle is brought in, the ſhining diſappears. A bit of it rubbed between two papers takes fire inſtantaneouſly, but if a perſon is not careful in the management of it, he is in danger of burning his fingers; and it penetrates deeper into the fleſh than common fire. M. Caſſini happening to preſs a piece in a cloth between his fingers, the cloth took fire; he endeavoured to extinguiſh it with his foot; but his ſhoe caught the flame; and he was forced to put it out with a braſs-ruler, which ſhot forth rays in the dark for two months after. This ſort of phoſphorus muſt be kept in a vial full of water. It diſſolves in all ſorts of diſtilled oils, and in that ſtate is called Liquid Phoſphorus; or it may be ground with pomatums into a luminous unguent.—See Mr. Boyle's treatiſe on this ſubject, entitled, *Noctiluca.*

wards midnight, and is next day expoſed to the ſun in order to be dried; but this ſort is leſs eſteemed, on account of its impurity and yellow colour. The third ſpecies, called Manna di Frondi, iſſues ſpontaneouſly, like a kind of ſweat, from the nervous parts of the leaves, on which the drops are indurated by the ſun into grains about the bigneſs of wheat; but this laſt ſort is not conſtantly gathered, becauſe it cannot be ſeparated from the leaves without the greateſt difficulty. This excellent drug is perhaps the moſt extenſively uſeful cathartic in the ſhops; being in its nature accommodated to perſons of all ages, ſexes, conſtitutions, and countries. That is reckoned beſt which is white and recent, the dark-coloured and brown being old and decayed.

THE Cork-tree, which grows plentifully in Italy, as well as in Spain and other warm countries, is a ſort of ever-green oak; whoſe leaves are green above and white underneath, and its fruit is a real acorn, more nouriſhing to ſwine than that of the common oak. Its bark, which is the cork, would ſplit and peel off of itſelf, being puſhed up by another bark formed underneath; but to prevent this effort of nature, and to acquire large and even pieces of cork, it is cuſtomary to make perpendicular inciſions the whole length of the tree, and circular ones towards the top and bottom of the trunk; and the bark being thus ſtripped off is laid in water to render it pliable, and flatted by loading it with heavy weights; after which it is dried, and put up in bales for carriage.

THERE is a kind of ſubterraneous vegetable production called Truffles, which are very common in Italy, and larger than in other parts of Europe. Mr. Bradley calls them Under-ground edible Muſhrooms, and Botaniſts in general now agree to rank them among the number of plants, though they ſeem to want moſt of the uſual parts thereof. All we know of their growth is, that they are at firſt no bigger than a pea, reddiſh without, and whitiſh within; and that, as they ripen, the white parts grow more duſky and black; but there ſtill remains a number of white ſtreaks, which all terminate at the places where the outer coat is cracked or open, and which are probably the veſſels whereby the truffles receive their nouriſhment. In theſe veſſels is found a whitiſh matter, and in the middle of it, when viewed with a microſcope, are perceived little round black grains, ſuppoſed to be the ſeed of the truffles *; for the curious obſervations of modern naturaliſts ſeem to have put it beyond diſpute, that all plants, even muſhrooms, moſſes, &c. have their ſeveral ſeeds †, though ſome are ſo ſmall as to

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* What confirms the opinion of Truffles coming from ſeed is, that they have been lately found in England, in a particular part of Northamptonſhire near Ruſhton, a place ſtocked with plants formerly brought from Languedoc; and it is only ſince that time that any Truffles have been there obſerved, whence it is concluded, that the ſeed of them was brought from France among the roots of the other plants. Dr. Hatton, who firſt diſcovered theſe Engliſh Truffles, obſerved ſeveral little fibres iſſuing out of them, which in all probability do the office of roots.

† Botaniſts have been extremely puzzled about the origin and production of muſhrooms, they being, till lately, unable to diſcover their ſeed by the beſt microſcopes; but it has been found that they, like all other vegetables, are produced by ſeed, and the London gardeners now raiſe great quantities of them on hot beds. Hence it is not difficult to account for the manner in which muſhrooms are produced, in different parts of the country, and their being found in ſome ſpots and not in others. It is well known that the ſeeds of plants cannot vegetate

to be abſolutely inviſible, at leaſt without the help of glaſſes.

TRUFFLES lie commonly about half a foot below the ſurface of the ground, and ſometimes deeper. They are tendereſt and beſt in the ſpring, but are moſt eaſily found in autumn, when the wet ſwells them, and the thunder and lightning diſpoſes them to ſend forth their ſcent, by which the ſwine frequently diſcover them and grub them up, from whence they are called Swine bread by the common people. In Italy they are reckoned a great dainty, either fried in ſlices with oil, ſalt, and pepper, or boiled in ſoup, or pickled. Some roaſt them in aſhes like potatoes, others pulverize and mix them in ſauces.

THOUGH ſome of the Alps and Apennines are very barren and rocky, yet many of them are

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vegetate every where, but only where they find certain juices fit to penetrate their coats, to excite a fermentation, and to afford them nouriſhment. Accordingly we may obſerve in what diverſity of places the different ſpecies of muſhrooms are produced, ſome of them growing only on other particular plants, whoſe trunk, bark or roots alone have juices proper to promote their vegetation. Hence it ſeems to follow, that the ſeeds of muſhrooms are ſcattered in numberleſs places where they do not vegetate, in a word, over all the earth; and the ſame may be ſaid of many other plants. The imagination indeed is ſhocked at ſuch a prodigious diſperſion of different ſeeds thrown every where at random, and in many places to no purpoſe; but the plants growing on the trunks of trees, on walls, in the clefts of rocks, &c. are inconteſtible proofs both of the vaſt multitude of ſeeds ſo diſperſed, and the neceſſity of certain circumſtances to make them vegetate.—If to the inviſible ſeeds of plants we join the inviſible eggs of inſects, we ſhall find the earth filled with an inconceiveable infinity of vegetables and animals, perfectly formed, and waiting only for certain favourable circumſtances to enable them to make their appearance. How rich then muſt the hand be that has ſown with ſo much profuſion!

covered with oaks, pines, cheſnut-trees, walnut-trees, &c. and others abound with variety of ever-greens and pleaſant ſhrubs, together with wild thyme, marjoram, and ſuch-like aromatic herbs and medicinal ſimples; but as a particular deſcription of theſe would be endleſs, as well as unneceſſary, we ſhall proceed to conſider ſome of the moſt remarkable animals of this country.

ANIMALS.

THE Alps and other mountains of Italy are ſtocked with various kinds of four-footed creatures, ſuch as wild boars, wolves, deer, hares, rabbits, &c. which are too well known to require a deſcription: but there are ſome with which we are leſs acquainted, and therefore deſerve our notice. The Marmote, or Marmotto, is a kind of rat inhabiting the higheſt and rocky parts of thoſe mountains, and feeding on the little graſs and wild herbs they afford. They are larger than the common rats, very fat, and ſleep all the winter *. Their fat ſerves the people to burn in their lamps, and is of ſome uſe in medicine, being recommended in nervous affections, and for ſtiffneſs and contractions of the joints.

THE Chamois is a ſort of wild goat, of which great numbers are found among the Alps, in ſhape

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* Mr. Martel, when he viſited the Glacieres of Savoy, was told by the country-people that the Marmotes provide themſelves a warm bed againſt their time of ſleeping; for which purpoſe one of them lies upon its back, whilſt another loads it with graſs or other herbs, and then drags it by the ears to their hole. They alſo informed him, that theſe animals provide againſt being ſurprized, by placing centinels, who give them the alarm by a whiſtling noiſe. He ſays the inhabitants eat the Marmotes, and find them very good meat.

and ſize reſembling the tame one, with ſhort ſmooth horns, hooked at the extremities. They leap from one rock to another with ſurprizing agility, and are the more difficult to be caught, as ſome of the herd are always on the hills about them, which by a certain noiſe give an alarm to the reſt upon any appearance of danger. The fleſh of theſe animals is very good, and of their ſkins is made the true Chamoy or Shammy leather, ſo much eſteemed for its ſoftneſs and pliancy, and its bearing ſoap without damage.

THE Bouquetins are another kind of wild goat, not ſo ſhaggy as the former, but much larger, having long horns, with which they make a ſtout and deſperate defence when they are attacked. They live on the higheſt mountains, ſeldom coming down into the valleys, which makes the hunting of them very troubleſome and dangerous; and when they are cloſely purſued, they will throw themſelves down the precipices, having the art of breaking their fall by the help of their horns, ſo as not to receive any hurt. The edges of their hoofs are ſo ſharp and hard, that they make an impreſſion upon the rocks; and it is ſaid they can ſmell a hunter at a great diſtance. The Savoyards dry their blood and preſerve it, eſteeming it an excellent remedy for pleuritic diſorders.

AMONGST the birds that frequent the Alps and other craggy mountains, the eagle is the nobleſt and moſt worthy obſervation. It is the largeſt, ſtrongeſt, and ſwifteſt of all the birds that live by prey, and its ſight is quick and piercing, even to a proverb *. It has a long hooked beak, yellow

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* By this means the eagle, and ſuch-like birds, can diſcover their prey at a great diſtance. " She dwelleth and abideth

yellow ſcaly legs, thick crooked talons, and a ſhort tail; and its plumage is cheſnut-coloured, brown, ruddy, and white. The eagle is diſtinguiſhed from the hawk by his bigneſs, and from the vulture by the crookedneſs of his beak, which is black at the tip, and blue in the middle, tho' in ſome yellow.—Theſe birds uſually make their airy or neſt on the higheſt rocks, conveying thither to feed their young not only partridges, pheaſants, woodcocks, &c. but even hares, lambs, kids, fawns, or whatever prey the neighbouring country affords *. If the rock where the neſt is built be not quite inacceſſible, it is uſual for the ſhepherds to climb up to it, and take away the proviſions from the young eagle while the old ones are abſent, leaving the entrails of animals, or

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bideth on the rock, on the crag of the rock, and the ſtrong place: from thence ſhe ſeeketh her prey, and her eyes behold afar off. Job. xxxix. 28, 29."—The reaſon why the eagle is able to face the ſun, and endure its brighteſt rays, is becauſe it has two ſets of eye-lids, the one thick and cloſe, the other thinner and finer, which laſt it draws over the eye when it views that luminous body. This thin covering of the eye, which is not peculiar to the eagle, but found in ſome other birds, fiſhes, &c. is what anatomiſts call the Nictitating Membrane.

[*] Mr. Ray mentions an eagle's neſt, found near the river Derwent in 1668, conſiſting of large ſticks, one end whereof was laid on a rock, and the other on two birch-trees. It was two yards ſquare, and had a young eagle in it, with the carcaſſes of one lamb, one hare, and three Grygalli.—Nor will eagles only ſeize upon lambs, kids, &c. but even children too, if they have an opportunity, as appears from an inſtance given us by Sir Robert Sibbald, of an eagle that took up a young child at a place called Houghton-Head, and carried it to its neſt in Hoy, one of the Orkney iſlands, four miles diſtant; but being immediately followed by four men in a boat, who knew where the neſt was, they brought back the child unhurt. Prodig. Nat. Hiſt. Scot. L. III.

ſome ſuch food, in the room of what they take: and thus the tables of ſome gentlemen are furniſhed with the beſt of game, though perhaps deprived of a leg or a wing by the voraciouſneſs of the parent-eagle or its offspring *.

If we deſcend to conſider the minuter part of the animal creation, perhaps we ſhall find nothing of that kind in Italy more ſurpriſing than the Tarantula, a venomous kind of Spider, chiefly found in Apulia near the city of Tarento, from whence its name. This inſect is about the ſize of an acorn, has eight legs and as many eyes, is hairy, and of various colours. From its mouth proceed two horns or trunks made a little crooked, with the points exceeding ſharp, through which its poiſon is emitted; and theſe horns are in continual motion, eſpecially when the animal is ſeeking for food, as if they did the office of noſtrils. Some are of opinion, that the bite or ſting of the Tarantula is only venomous in the heat of ſummer; however, it is particularly dangerous at that ſeaſon, producing very fatal and aſtoniſhing effects. The bite at firſt occaſions a pain like that of the ſtinging of a bee, and in a few hours the patient feels a numbneſs, and a livid circle appears about the part affected, which ſoon riſes into a painful tumor. In a little time he falls into a profound ſadneſs, breathes with difficulty, his pulſe grows feeble, and at length he loſes all ſenſe

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* M. de Thou, in the Memoirs of his Life, tells us, that he himſelf once dined with a certain great man, and obſerved with ſome ſurprize that all the wild fowl brought to table wanted a leg, wing, or other part, till he was informed they were taken as above-mentioned from an eagle's airy in the neighbourhood.

and motion. Some people wounded by this inſect ſhew a ſtrange averſion to this or that particular colour, and expreſs great pleaſure at the ſight of others. Tremblings, anger, fear, laughter, obſcene talk and actions, are likewiſe ſome of the ſtrange ſymptoms attending perſons bit by the Tarantula; and the wound proves mortal in a few days, unleſs proper means are uſed to expel the poiſon. All the aſſiſtance of medicine in this caſe is found to be of little efficacy, muſic being the only certain remedy yet diſcovered. Accordingly, when the patient has loſt his ſenſe and motion, a muſician tries ſeveral briſk tunes, till he hits upon one that is agreeable to the diſordered perſon; which is known by his firſt moving his fingers, then his arms, then his legs, and by degrees his whole body, till at length he riſes and begins to dance, which he continues for ſeveral hours without intermiſſion. He is then put to bed, and when he is thought to have ſufficiently recovered his ſtrength, the muſician plays up the ſame tune, upon which he riſes and renews his dancing. This exerciſe is continued for five or ſix days together, till the patient finds himſelf exceedingly fatigued, and unable to dance any longer, which is a ſign of his being cured; for as long as the poiſon operates he ſhews no wearineſs. When he comes to himſelf, he is like one awaked out of a ſound ſleep, having no remembrance of his dancing, or any thing that paſſed during his diſorder. If the cure be not thoroughly effected, a melancholy gloom continues to hang about him, he avoids company, and perhaps takes an opportunity of drowning himſelf. Some people have annual returns of their fits for many years together, at which times recourſe is had, as before,

fore, to muſick and dancing, nothing elſe affording any relief *.

In ſome parts of Naples, particularly in Apulia, the venom of the ſcorpions is ſo ſubtle, that their

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* M. Geoffroy accounts for the effects of the Tarantula's bite, by ſuppoſing the poiſon to give the nerves a degree of tenſion beyond what is natural or proportionate to their functions, whence ariſes a privation of knowledge and motion. But at the ſame time this tenſion, equal to that of ſome ſtrings of an inſtrument, puts the nerves in uniſon to certain tones, and obliges them to ſhake, when agitated by the undulations and vibrations of the air proper to thoſe tones. And hence this wonderful cure by muſick, which having reſtored the nerves to their motion, they call back the ſpirits that had abandoned them.—Dr. Mead imagines the malignity of the Tarantula's poiſon to conſiſt in its great force and energy, whereby it immediately raiſes an extraordinary fermentation in the whole arterial fluid. And as to perſons bit by this inſect, the benefit they receive from muſick ariſes not only from their dancing to it, and ſo evacuating by ſweat a great part of the poiſon; but the repeated percuſſions and vibrations of the air ſhake the contractile fibres of the membranes of the body, eſpecially thoſe of the ear, which being contiguous to the brain communicate their tremblings to its membranes and veſſels; and thus the coheſion of the parts of the blood is broken, and the coagulation prevented.—No body will doubt the truth of this, who conſiders the wonderful effects of muſick in variety of other inſtances both ancient and modern. Timotheus could excite Alexander's fury by the Phrygian mode, and ſooth him into indolence by the Lydian; and a certain muſician is ſaid to have put Eric king of Denmark into ſuch a rage as to kill ſome of his beſt ſervants. So likewiſe an Italian, mentioned by Dr. Niewentiit, by varying his muſick from briſk to ſolemn, and *vice verſâ*, could work up the hearer to madneſs and diſtraction.—But muſick not only exerts its influence on our affections, but on the parts of our bodies alſo; as appears from the Gaſcon knight mentioned by Mr. Boyle, who could not contain his water at the playing of a bagpipe; ſo that a perſon, whom he had diſobliged, cauſed him by that means to bepiſs himſelf at a feaſt, when he was hemmed in with company.

their ſting produces the ſame effects as the bite of the Tarantula; and though the ſame tunes have a proper effect on theſe ſpecies alſo, yet they require ſofter inſtruments, as the flute, &c. accompanied by a briſk beat of the drum. This pernicious animal, not only harbours in old buildings and under large ſtones, but infects the houſes in the kingdom of Naples, ſo that in ſome places it is not unuſual to make their bedſteads of poliſhed iron, and to place them at ſome diſtance from the walls, to prevent their getting into the beds. It is true, they ſeldom hurt any one, unleſs they are firſt aſſaulted, or accidentally injured, which may be eaſily done by a man's turning himſelf, or moving a leg or an arm in a bed, where theſe noxious animals harbour. In the northern parts of Italy this creature has little or nothing of that rage and venom which appear in thoſe of hotter climates.

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company. The ſame author tells us of a woman that would burſt into tears on hearing a certain tune, with which other people were little affected. And we have an inſtance in the Hiſtory of the Academy of Sciences, of a muſician who was cured by a violent fever by a concert played in his chamber. —Nor are our minds and bodies alone affected by ſounds, but alſo things inanimate. Kirchir, amongſt many ſtories of the like nature, tells us of a large ſtone that would tremble at the ſound of one particular organ-pipe; and Morhoff mentions a Dutchman who could break rummer-glaſſes with the tone of his voice. Merſenne takes notice of a pavement that would ſhake, as if the earth would open, when the organs played: and Mr. Boyle ſays, that ſeats will tremble at the ſound of organs, and that he has felt his hat do ſo under his hand at certain notes both of organs and diſcourſe. —Theſe, and many other well-atteſted inſtances of the ſtrange effects of ſounds that might be mentioned, may help us in ſome meaſure to account for, at leaſt induce us to believe, the power of muſick over perſons diſordered by the bite of the Tarantula.

ANOTHER inconvenience, but common to all Italy, is the ſwarms of lizards, eſpecially of the green kind. Hundreds of theſe little animals are ſeen in the ſpring, on the flat roofs, and as they crawl up and down the walls, if a window or door be left open, they make their way into the houſes. About Capua, Fondi and Gaeta, there is a noxious ſpecies of lizards, improperly called Tarantula, whoſe bite is attended with danger: theſe are brown, larger than the green ſort; and when the tail is cut off, reſemble a toad.

ABOUT ten miles from Ancona are ſound along the ſhallows of the ſea-ſhore, the Ballani, a ſort of ſhell-fiſh, which when alive, harbour in a kind of large ſpungy ſtone; and from the reſemblance to a date-kernel are called Sea-dates. Frequently twenty or thirty of theſe are found in one ſtone, but the largeſt do not much exceed a finger's length. Many of theſe ſtones have little orifices on their ſurface, but others have none; notwithſtanding which the fiſh live and grow in them. When they fiſh for Ballani, they pick up ſuch ſtones as have their ſurface full of little holes, theſe being a certain ſign that the fiſh have inſinuated themſelves into them: but ſometimes the aperture through which the ſpawn, or ſmall fry of the fiſh, have penetrated into the ſtone, happens to be afterwards ſtopped up, ſo as not to be diſcernable, and yet they thrive very well. They have no more room than is juſt neceſſary to open their ſhell a little way, this having been gradually abraded by their motion, in order to make room for their growth. The only way of getting them out, is by breaking the ſtone; for the paſſage by which they entered is much too ſmall even for the young fry to come out at. If two or more of theſe ſhell-fiſh happen by their growth to come into contact with each other in the ſame ſtone, only one fiſh is found to be alive. The inſide of the ſhell is white, but the outſide of an aſh-colour. When taken out of the ſtone a gut reſembling a worm about the length of a man's finger hangs to them. This is entirely white, and full of clear water, which it ſquirts out when pleaſed. Such as find a particular delicacy in the taſte of theſe fiſh, ſay, that they do not feed on the groſſer parts of the ſea-water, but as it were on the ſubtile dew which penetrates through the ſtone, and thus undergoes a kind of filtration. It is very remarkable, that both the fiſh and the juices got from them are ſo luminous in the dark, that one might read by them; and even the water into which this fiſh has been ſqueezed, when put in a glaſs, emits an effulgence that laſts between ten or twelve hours. Great quantities of theſe fiſh are ſent to Rome, where they are reckoned dainties.

ANTIQUITIES.

ITALY abounds with ſo many noble monuments of antiquity, that it is impoſſible we ſhould give an account of them all, without far exceeding the limits and deſign of our undertaking. We cannot forbear, however, being a little particular in deſcribing thoſe of Rome, that celebrated metropolis and once miſtreſs of the world, every part of which is filled with evidences of its ancient grandeur.

OF the Pagan Temples remaining in that city, the Pantheon, uſually called the Rotunda from its circular form, is one of the moſt entire and beautiful. It is now dedicated to the Bleſſed Virgin and all Saints, as it was anciently to all the heathen deities. This temple is a hundred and fifty feet high, and about as many in diameter; its roof is vaulted in form of a dome or cupola, but open at top, from whence the ſtructure receives all its light. The walls are lined with marble. The portico is exceedingly majeſtic, being ſupported by ſixteen tall columns of Egyptian granite, each conſiſting of one ſtone, of the Corinthian order; and the gate is forty feet high and twenty wide. The Pantheon was built by Agrippa, ſon-in-law of Auguſtus, as appears by an inſcription ſtill remaining over the portico.

Mr. Smollet, contrary to the opinion of moſt travellers, confeſſes himſelf diſappointed at the ſight of this ſtructure; but obſerves, that the portico which Agrippa added to the building, is undoubtedly very noble, though, in his opinion, it correſponds but ill with the ſimplicity of the edifice. That ingenious gentleman, compares this ſtructure to a plain, unpierced cylinder, or circular wall, with two fillets and a cornice, having a vaulted roof or cupola, open in the centre, twenty-nine feet in diameter; and adds, that he wonders Pope Urban VIII. who cauſed the columns to be guilt, and alſo added two belfry towers to the rotunda, did not cover the central hole with glaſs, as it muſt be very inconvenient and diſagreeable to thoſe who go to church below, to be expoſed to the rain in wet weather, which muſt alſo render it very damp and unwholeſome.

The temple of Fortune has withſtood the injuries of time, and is now a chriſtian church; as is alſo the temple of the Sun, or of Veſta, which is a ſmall round ſtructure, receiving its light from a hole in the top, after the manner of the Pantheon.——The church of St. Stephen on mount Celio, was formerly the temple of Faunus. It is a large a large round edifice, ſupported by two circles of pillars, one within the other, the pillars of the outermoſt circle being leſs than thoſe of the innermoſt, and juſt twice the number.

WITHOUT the walls is the church of St. Conſtantia, originally a temple of Bacchus, which remains almoſt entire, and has ſuffered little alteration. It is likewiſe of a circular form, ſuſtained by twelve large pillars without, and twelve leſſer ones within. The tomb of Bacchus is of porphyry, adorned with vine-branches, boys treading grapes, birds, and other animals, in baſſo-relievo. The roof is alſo beautified with moſaic work, repreſenting bunches of grapes, and ſeveral things relating to the vintage: but ſome ſuſpect theſe ornaments are not ſo antient as the temple itſelf.

THERE is ſcarce any thing ſtanding of the temple of Peace, except three arches, but by tracing the foundation it appears to have exceeded all the other temples of Rome in its dimenſions. The magnificence of the Romans, ſays Mr. Smollet, was not ſo conſpicuous in their temples, as in their theatres, amphitheatres, circuſſes, naumachia, aqueducts, triumphal arches, porticoes, baſilicæ, but eſpecially their thermæ, or bathing places. A great number of their temples were ſmall and inconſiderable; not one of them was comparable either for ſize or magnificence to the modern church of St. Peter of the Vatican. The famous temple of Jupiter Capitolinus, was neither half ſo long, nor half ſo broad, it was but two hundred feet in length, and one hundred and eighty-five in breadth; whereas the length of St. Peter's extends to ſix hundred and thirty-eight feet, and the breadth to above five hundred. It is very near twice as large as the temple of Jupiter Olympius

lympius in Greece, which was counted one of the ſeven wonders of the world.

Of the Triumphal Arches remaining in Rome, there is one very entire, which was erected to Septimius Severus in memory of his Parthian conqueſts. It is of marble, and adorned on each ſide with baſs-reliefs, repreſenting the victories of that emperor, and the under part of it is finely wrought with a vaſt variety of flowers.—But the arch of Conſtantine the Great, though ſomewhat broken and defaced, is the nobleſt ſtructure of this kind in Rome, and perhaps in the whole world. It was erected to him by the ſenate, on account of his victory gained over the tyrant Maxentius, and was beautified with excellent ſtatues and baſs-reliefs, repreſenting his moſt memorable actions. Several of theſe ſtatues have now loſt their heads, which it is ſaid were removed to Florence by one of the dukes of Tuſcany.—The arch of Titus, erected to him in memory of his taking and deſtroying the city of Jeruſalem, is more defaced than either of the former; but one may ſtill diſcern upon it a repreſentation of the river Jordan, and many of the ſpoils of Solomon's temple.

There are four Columns in Rome, that are remarkable for their antiquity and excellent workmanſhip, particularly that erected in honour of the emperor Trajan, which is about a hundred and thirty feet high, excluſive of the pedeſtal. It conſiſts of large pieces of white marble, hollow within, and ſo curiouſly cemented, as to ſeem but one entire ſtone. Within it there is a ſpiral ſtaircaſe up to the top, to which the light is admitted by many little windows; and the outſide is adorned with fine baſs-reliefs, repreſenting the great actions of that emperor. Inſtead of a golden urn at the top of it, in which his aſhes were depoſited, there is now a ſtatue of St. Peter.

THE column of Antoninus Pius is taller than that of Trajan, but inferior to it in the beauty of the workmanſhip. In the room of the emperor's ſtatue, which was formerly on the top of it, there is one of St. Paul. The ornaments on the outſide are of the ſame nature as thoſe on the Trajan column; and amongſt other hiſtorical pieces, there is a figure of Jupiter Pluvius ſending down rain on Antoninus's fainting army, and thunderbolts on his enemies; which ſeems to be a great confirmation of the ſtory of the Chriſtian Legion *.

THE Columna Roſtrata is a curious piece of antiquity, having been erected to the honour of Caius Duilius, for a ſignal victory gained over the Carthaginian and Sicilian fleets, above 250 years before the birth of our Saviour. It was adorned

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* Eccleſiaſtical hiſtorians relate, that in one of Antoninus's expeditions, when his army was ſurrounded by the enemy, and ready to periſh for want of water, a legion conſiſting of chriſtian ſoldiers obtained by their prayers a plentiful ſhower of rain, and at the ſame time a terrible ſtorm of thunder and lightning, which deſtroyed great numbers of the enemy's army, and made way for a compleat victory. Mr. Addiſon has given us a tranſlation of a beautiful paſſage in Claudian, deſcribing the effects of this tempeſt.

When, with deſcending ſhow'rs of brimſtone fir'd,
The wild Barbarian in the ſtorm expir'd.
Wrapt in devouring flames the horſeman rag'd,
And ſpurr'd the ſteed in equal flames engag'd.
Another pent in his ſcorch'd armour glow'd,
While from his head the melting helmet flow'd:
Swords by the lightning's ſubtil force diſtill'd,
And the cold ſheath with running metal fill'd.
No human arm its weak aſſiſtance brought,
But Heav'n, offended Heav'n, the battle fought.

with the beaks of the veſſels taken in the engagement, and has an inſcription on its baſe, but great part of it is not legible.—The Milliary Column, from whence the Romans reckoned their miles to all parts of Italy, is ſtill to be ſeen at Rome. It is of white marble, about eight feet high, and formerly ſtood in the Forum Romanum, but is now removed to the Capitol.

OF the great number of Obeliſks that were in antient Rome, the moſt beautiful now remaining ſtands in the piazza before St. Peter's church, whither it was brought from the Circus of Nero, in the ruins whereof it had lain buried for many ages. It is one entire piece of Egyptian marble, ſeventy-two feet high, twelve feet ſquare at the baſe and eight at the top, and is computed to weigh above 478 tons, and ſuppoſed to be at leaſt three thouſand years old. Notwithſtanding its immenſe weight, it was erected on a pedeſtal thirty feet high (whereon it now ſtands) by that celebrated architect Dominico Fontana, in the pontificate of Sixtus V, with vaſt expence and labour, and to the aſtoniſhment of all the ſpectators.

THE Obeliſk which ſtands before the church of St. John de Lateran is the talleſt in Rome, being a hundred and eight feet high without the pedeſtal, nine feet and a half at the baſe one way, and eight the other. On each face of it are ſeveral rows of hieroglyphicks, a ſort of myſtic figures or characters uſed by the antient Egyptians to conceal the ſecrets of their theology. It is thought to have been conſecrated to the ſun in the city of Thebes, about twelve hundred years before the coming of Chriſt; and having been ſent to Rome by the ſon of the emperor Conſtantine was ſet up in the Circus Maximus, where it was found buried in the ruins, and broken into three pieces. The parts were cemented by the ingenious architect juſt mentioned, and placed in their preſent ſituation.

THERE is another fine Obeliſk, which was brought from Heliopolis in Egypt, and likewiſe lay a long time broken to pieces among the ruins of the ſame Circus, till it was joined together, and erected in the Piazza del Popoli by the direction of the aforeſaid Fontana.—As to the other obeliſks in Rome, they are of a ſmaller ſize, and ſome of them ſeem to be the tops of obeliſks broken off; but the hieroglyphicks upon them are ſufficient proofs of their antiquity.

OF the antient Theatres and Amphitheatres in this city, we find only the ruins of four remaining, viz. ſome ſmall footſteps of the theatre of Pompey, part of the theatre of Marcellus, of the amphitheatre of Statilius Taurus, and of that of Titus, now called the Coliſeo, of which there are large remains. This noble ſtructure was not only remarkable for the beauty of its architecture, but for its dimenſions and admirable contrivance, having ſeats capable of containing eighty-five thouſand ſpectators. It was of an oval figure within, and adorned with ſtatues repreſenting the ſeveral provinces of the Roman empire, in the middle whereof ſtood that of Rome, holding a golden apple in her hand.

THE Circi were large ſtructures, either of an oblong or oval form, built for the celebration of various games and exerciſes, as we have heretofore obſerved; but of theſe there are ſcarce any traces remaining. One may juſt diſcern indeed the form of the Circus Maximus, which was built by Tarquinius Priſcus, and enlarged to ſuch a prodigious extent by ſucceeding princes, as to contain in their proper ſeats two hundred and ſixty thouſand ſpectators.

THERE are ſtill ſome remains to be ſeen of ſeveral Thermæ or Baths of the ancient Romans; but the moſt conſiderable are thoſe of Antonine and Diocleſian. The ruins of the former look more like thoſe of a town than of a ſingle fabric; and thoſe of the latter are near a mile in compaſs, which is not to be wondered at, if we conſider, that they contained cells ſufficient for two thouſand three hundred perſons to bathe at one time, without being ſeen by one another. They were adorned with all the charms of painting, architecture, and ſculpture. The pipes for conveying the water were ſometimes of ſilver, and many of the lavacra were of precious marble, illuminated by lamps of cryſtal.

THE Aqueducts were ſome of the nobleſt and moſt uſeful deſigns of the Romans, but of thoſe which conveyed water to ancient Rome there are only ſome ſmall parts remaining; except of that called Aqua Virginis, which being repaired by Pope Nicholas V. is ſtill in uſe, and known by the name of Fonte di Trivio. The old Aqueduct, which Paul V. reſtored, brings water from a collection of ſprings, almoſt forty miles diſtant from the city.

OF the Mauſolea or funeral monuments of illuſtrious perſons among the Romans, there are few in Rome or its neighbourhood that are remarkable enough to require a deſcription. That of the emperor Adrian is now a part of the caſtle of St. Angelo, but ſtripped of its ſtatues and other ornaments.—The tomb of Caius Seſtius is a ſquare pyramid of brick, but covered over with white marble; and is ſtill entire, having been repaired by Alexander the VIIth. It is a hundred and twenty feet high, and almoſt a hundred broad at the baſe. We enter into it through a narrow paſſage, which leads to a vaulted room, where we yet diſcern the figures of women, flowers, veſſels, and other ornaments painted on the plaiſter.

THE mention of theſe ſepulchral monuments leads us to give ſome account of the Catacombs, as they are called, which are a vaſt number of ſubterraneous alleys or galleries in the neighbourhood of Rome, that appear to have been ancient repoſitories of the dead, but whether originally dug by the heathens or the primitive Chriſtians has been much diſputed by the learned. Each alley or paſſage is about four foot broad, and ſix or eight foot high, and are not only carried on ſtrait forward to a ſuprizing length, but have others running off every way like ſo many lanes or ſtreets of a city: On the ſides of theſe alleys were the niches or graves wherein the dead bodies were depoſited, which were laid lengthwiſe, three or four rows one over another, parallel to the alley. Each of theſe graves was juſt capable of receiving one body, and had its mouth cloſed with large tiles, and ſometimes pieces of marble cemented together in a curious manner *. On ſome few of theſe

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* Biſhop Burnet, who ſaw both the Catacombs of Rome and Naples, gives us a particular deſcription of the latter, which are much more lofty and ſpacious than the former, the alleys being generally about 20 foot broad, and fifteen high; and inſtead of three or four rows of niches, as in the Roman Catacombs, there are ſix or ſeven in thoſe of Naples. But the biſhop ſaw no ſigns of any thing intended to cloſe up theſe niches when the bodies were laid in them; ſo that they muſt have been very unwholeſome ſtinking places, where ſome thouſands of bodies lay rotting, without any thing to ſhut in ſo loathſome a ſight and ſmell, for the niches appear to be too low for coffins.

tiles is found the name of the deceaſed perſon; but frequently a palm-tree, engraven or painted. In ſome places there are little grottos or chapels hewn out of the rock, going off from the common gallery, which have niches all round them; and are ſometimes adorned with old moſaic work or painting: theſe ſeem to have been the burial-places of particular families.—As to the opinion of the primitive Chriſtians digging theſe caves, and not only burying their martyrs there in times of perſecution, but aſſembling in them for the performance of divine ſervice, it is highly improbable; for as it is not to be conceived how they could carry on ſuch a vaſt work unknown to their perſecuting governors, conſidering the multitude of hands that muſt have been employed, and the mountains of rubbiſh brought out of theſe prodigious caverns, ſo likewiſe it is abſurd to think they could hold their aſſemblies amidſt the annoyance of ſo much ſtench and corruption *. It is therefore more reaſonable to ſuppoſe (with Proteſtant writers in general) that the Catacombs were originally the common ſepulchres of the ancient Romans, and were not uſed after the cuſ-

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* This is the ſentiment of the biſhop lately mentioned, who tells us, he found the ſteams in the Catacombs of Naples ſo ſtrong, that though he was as little ſubject to vapours as moſt men, yet he had all the day long, after he was in them, which was not near an hour, a confuſion, and as it were a boiling in his head that diſordered him extremely; whence he infers, that if there is now ſo much ſtagnating air there, it muſt have been much more ſenſible and intolerable whilſt vaſt numbers of bodies were rotting in the niches.——The ſame prelate is of opinion, that the Catacombs were originally the burial-places of the antient Romans; but he thinks it undeniable from genuine inſcriptions that have been found in them, that they were uſed for the ſame purpoſe by the Chriſtians of the fourth and fifth centuries.

tom of burning the dead was introduced amongſt them, unleſs for ſlaves and the meaner ſort of people *.

HAVING ſaid ſo much of the antiquities of Rome, we muſt be more brief on thoſe of other parts of Italy; but ſome of them are too remarkable to be paſſed over in ſilence. The noble amphitheatre at Verona is the beſt preſerved of any ſtructure of that kind, the inſide of it being ſtill almoſt entire. It is of an oval figure, having forty-four rows of ſeats of white marble, placed one over another, each being about eighteen inches high and as much in breadth, ſo that the whole would conveniently contain 23,000 ſpectators.

THE city of Rimini ſtill ſhews ſeveral monuments of its ancient ſplendor, particularly a fine marble bridge of five arches, begun by Auguſtus and finiſhed by Tiberius. A triumphal arch built by Auguſtus, which is likewiſe of marble, ſerves at preſent for one of its gates, though part of it is deſtroyed. There is alſo a Suggeſtum, (looking much like the pedeſtal of a pillar) from whence Cæſar is ſaid to have harangued his ſoldiers after he had paſſed the Rubicon.

BUT perhaps no part of Italy, except Rome, abounds more with remains of antiquity than

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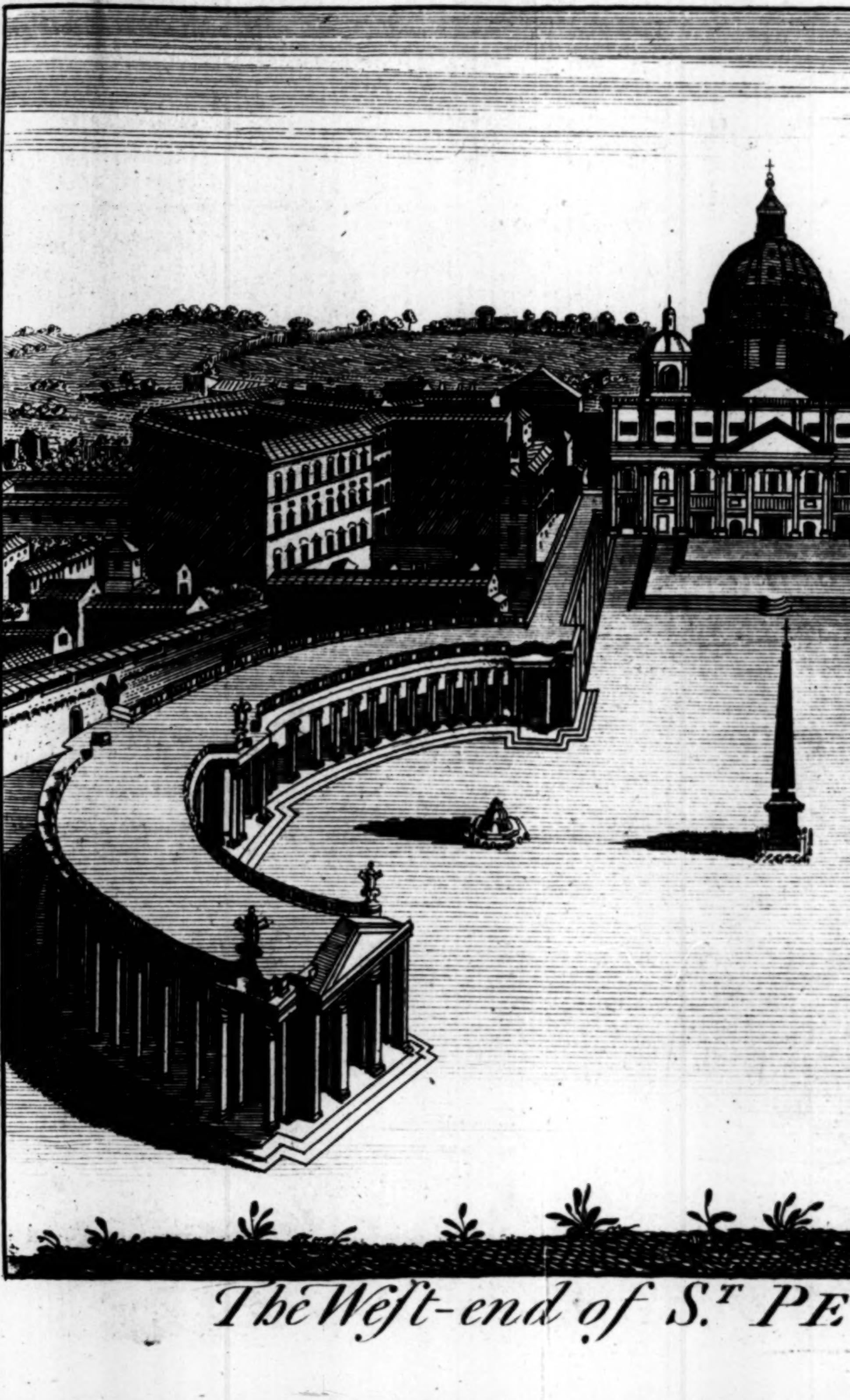
* Laying up the bodies in caves was a very ancient way of diſpoſing of the dead, and appears to have been propagated by the Phœnicians wherever they ſent their colonies. When a hero died, or was killed in a foreign expedition, it was uſual to burn his body, in order to bring home the aſhes, and thereby oblige the Manes to follow, that ſo his country might not be deprived of the benefit of his tutelage. This Mr. Monro thinks was the original of burning the dead, which by degrees became common to all who could bear the expence.

the neighbourhood of Pozzuoli and Baia, amongſt which are ſeveral pillars ſtanding in the bay, in a great depth of water, which are commonly reckoned a part of Caligula's bridge, though ſome of our moſt judicious travellers have made it appear, they ſupported the arches of a ſtrong and ſtately mole built for the defence and convenience of the harbour. Be this as it may, the work muſt have been prodigious; as is alſo the Piſcina mirabilis, or Wonderful Fiſh-pond, which ſeems to have been a reſervoir of water, ſupported by eight and forty large pillars, all hewn out of the rock. It is 150 paces long, thirty high, and forty broad, and is laid over with old plaiſter now as hard as ſtone itſelf. Some aſcribe this work to Nero, though others ſay it was built by Agrippa, to preſerve water for the uſe of his navy.——The other curioſities in this neighbourhood are the Centum Cameræ, or Hundred Chambers, being a great number of large rooms cut out of a rock, and covered over with plaiſter; the houſe and ſepulchre of Agrippina, the mother of Nero; that of Virgil; the ruins of the ſeat of Hortenſius, of an amphitheatre and a circus; the grottos already deſcribed, and many others, on which we have not room to enlarge.

Before we leave this ſubject we ought to take notice of the noble remnant of the Via Appia, which runs along for about thirty miles between Rome and Naples. This highway, which was begun in the conſulate of Appius Claudius Cæcus, from whom it takes its name, extended quite from Rome to Brunduſium, (now Brindiſi) upwards of three hundred miles, and was more frequented by perſons of quality among the ancient Romans than any other in Italy. It is twelve foot broad, conſiſting chiefly of blue ſtones of a cubical form, each ſide meaſuring a foot and a half. The ſtrength of this pavement appears from its long duration, for it has now laſted above two thouſand years, and is for ſeveral miles together as entire as when it was firſt made.—The Via Flaminia was another famous road of this nature, extending northwards from Rome to Rimini. Some remains of it are ſtill to be ſeen, (but not ſo entire as the Via Appia) from whence it appears to have been paved with broad flints and pebbles, having on each ſide a border of ſtone.—From this account of the antiquities of Italy, we proceed to deſcribe ſome of its cathedrals and other ſtructures, which, compared with thoſe already mentioned, may be ranked amongſt its modern

BUILDINGS.

THE cathedral church of St. Peter in Rome, is eſteemed a maſter-piece of modern architecture, and ſtrikes the ſpectator with admiration and pleaſing aſtoniſhment. The circular area which lies before this magnificent edifice is encompaſſed by a beautiful periſtyle or colonnade, conſiſting of 284 marble pillars of the Doric order, which ſupport an architrave, adorned with a vaſt number of ſtatues of ſaints and martyrs. The obeliſk already mentioned, and a fine fountain on each ſide of it, are great additions to the beauty of this ſpacious court, from whence there is a flight of ſteps to a grand platform or terrace, that leads into the lofty portico before the church. Over this portico, which is ſupported by pillars three fathoms in circumference, are the ſtatues of our Saviour, and the twelve Apoſtles; and there is a fine balcony, wherein the popes are crowned in view of all the people. The body of the church,



The West-end of S.^T PE

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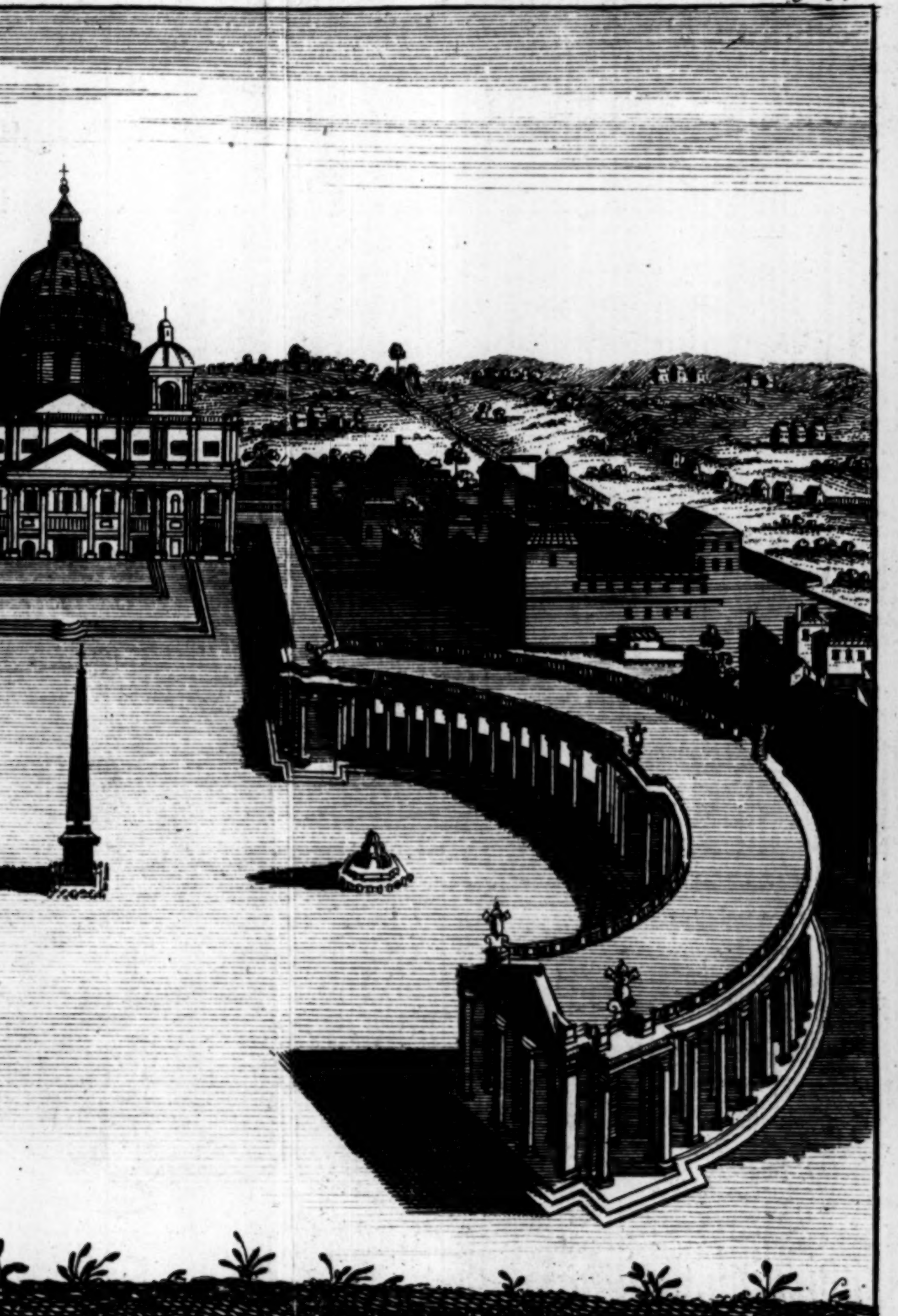

B. Cole sculp.

T PETER'S at ROME.

church, as well as the cupola, which is adorned with curious moſaic work, is ſuſtained by large ſquare pillars like thoſe of St. Paul's; and under the middle of the cupola ſtands the high altar, which is ninety feet in height, being a kind of pavilion ſupported by four wreathed columns of braſs, adorned with foliage, and on the top of the canopy are four angels of gilt braſs, holding feſtoons of flowers moſt beautifully carved; and between them are figures of children playing on the cornice. We aſcend to the dome by a winding ſtair-caſe without ſteps, and from thence to the ball by ſtairs not very commodious, which lie between the outer and inner dome. The height from the pavement to the top of the croſs, which is over the ball, is four hundred thirty-two feet, and the diameter of the ball eight feet four inches. St. Peter's chair is all of braſs gilt, and ſupported by four gigantic figures, repreſenting four fathers of the church, with a gilded glory over them reaching quite to the roof. Under this chair there is an altar, and on each ſide are ſtately monuments of braſs and marble, of excellent workmanſhip. It is ſcarce poſſible to deſcribe the riches and beauty of the little chapels and altars round this church; in a word, the gilding, carving, paintings, emboſſed work, braſs and marble ſtatues, &c. are ſo well contrived and diſpoſed, that the abundance occaſions not the leaſt confuſion, nor does any thing appear ſuperfluous. But among all the ornaments of this cathedral, perhaps none deſerve our attention more than the moſaic pictures *, which repreſent a great many

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* Moſaic Work, is an aſſemblage of little pieces of glaſs, marble, precious ſtones, woods, or the like, of various colours,

ny pieces of ſcripture and eccleſiaſtical hiſtory, and exceed any thing of that kind that ever was done by the ancients.

Mr. Smollet, ſpeaking of this church, in his travels through Italy, ſays, "The piazza is altogether ſublime. The double colonade on "each ſide extending in a ſemi-circular ſweep, "the ſtupendous Egyptian obeliſk, the two foun- "tains, the portico, aud the admirable façade of "the church, form ſuch an aſſemblage of mag- "nificent objects, as cannot fail to impreſs the "mind with awe and admiration: but the church

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lours, cut ſquare and cemented on a ground of plaiſter, &c. imitating the natural colours and degradations of painting. In this ſenſe it includes marquetry or inlaid work, vaneering, &c. but in its more proper and reſtrained ſenſe it only takes in works of ſtone, metals, and glaſs, thoſe of wood being diſtinguiſhed by the name of Marquetry. The moſaic of marble, which at preſent is moſt in uſe, ſerves for the pavements of churches and palaces, and the incruſtation of the walls of the ſame edifices; but that of precious ſtones is ſo expenſive, that it is ſeldom uſed unleſs in ſmall works, ſuch as ornaments for altar-pieces, rich tables, &c. The moſaic work ſo much admired in St. Peter's at Rome is done with coloured glaſs, which kind, though now little uſed, is of a ſurprizing durableneſs and luſtre. It is laid on a ſort of plaiſter compoſed of lime, fine brick-duſt, gum-tragacanth, the whites of eggs, and other ingredients; the pieces of glaſs being ranged with ſo much juſtneſs, and the light and ſhadow ſo well obſerved, that they appear as ſmooth as a table of marble, and as finiſhed as a painting in Freſco, with this advantage, that they have a fine luſtre, and will laſt almoſt for ever, whereas time effaces all other kinds of painting.—There is another ſort of moſaic work, of a more modern invention than any of the former, made with a kind of Gypſum or Talc found in the ſtone quarries near Paris. Of this Talc, calcined in a kiln, beaten in a mortar, and ſifted, they form a ſort of artificial marbles, imitating precious ſtones, and of theſe compoſe a moſaic work, little inferior to the natural ſtones, either in point of durableneſs or luſtre.

" would have produced a ſtill greater effect, " had it been detached entirely from the buildings of the Vatican. It would then have been " a maſter-piece of architecture, complete in all " its parts, intire and perfect; whereas, at preſent, it is no more than a beautiful member at- " tached to a vaſt undigeſted and irregular pile of " building. The great picture of moſaic work, " and that of St. Peter's bark, toſſed by the " tempeſt, which appear over the gate of the " church, though rude in compariſon with mo- " dern pieces, are nevertheleſs great curioſities, " when conſidered as the work of Giotto. But I " was not at all pleaſed, ſays he, with the famous " ſtatue of the dead Chriſt in his mother's lap, " by Michael Angelo. The figure of Chriſt is " as much emaciated, as if he had died of a " conſumption; beſides, there is ſomething in- " delicate, not to ſay indecent, in the attitude " and deſign of a man's body ſtark naked, lying " upon the knees of a woman.—The altar of " St. Peter's choir, notwithſtanding all the or- " naments which have been laviſhed upon it, is " no more than a heap of puerile finery, better " adapted to an Indian Pagod, than to a temple " built upon the principles of the Greek archi- " tecture. The four Coloſſal figures that ſupport " the chair, are both clumſy and diſproportioned. " ——The tribune of the great altar, conſiſting " of four wreathed braſs pillars, gilt, ſupporting " a canopy, is doubtleſs very magnificent, if not " over-charged with ſculpture, fluting, foliage, " feſtoons, and figures of boys and angels, which, " with the hundred and twenty-two lamps of " ſilver, continually burning below, ſerve rather " to dazzle the eyes, and kindle the devotion of

" the ignorant vulgar, than to excite the admi-
" ration of a judicious obſerver.

" THERE is nothing, I believe, in this fa-
" mous ſtructure, ſo worthy of applauſe, as the
" admirable ſymmetry and proportion of its parts.
" Notwithſtanding all the carving, gilding, baſ-
" ſo-relievos, medallions, urns, ſtatues, columns,
" and pictures, with which it abounds, it does
" not, on the whole, appear over-crowded with
" ornaments. When you firſt enter, your eye
" is filled ſo equally and regularly, that nothing
" appears ſtupendous, and the church ſeems
" conſiderably ſmaller than it really is. The
" ſtatues of children, that ſupport the fonts of
" holy-water, when obſerved from the door, ſeem
" to be of the natural ſize; but as you draw
" near, you perceive they are gigantic. In the
" ſame manner, the figures of the doves, with
" olive branches in their beaks, which are re-
" preſented on the wall, appear to be within
" your reach; but as you approach them, they
" recede to a conſiderable height, as if they
" had flown upwards to avoid being taken."

NEXT to St. Peter's, the cathedral church of Milan is by ſome reckoned the moſt magnificent ſtructure in Italy. It is a vaſt Gothic edifice, about five hundred feet in length, and two hundred in breadth, and is all of marble. A hundred and ſixty pillars of white marble ſupport its ſtately roof, each of them valued at ten thouſand crowns. The choir is wainſcotted, and adorned with beautiful carved work, repreſenting the hiſtories of the Goſpel. The high altar is very ſumptuous and majeſtic; and here are two noble brazen pulpits, each of them running round a large pillar like a balcony, and ſupported by huge figures of the ſame metal. As to the ſtatues about this church, their number is prodigious, many of them as big as the life, and ſome of exquiſite workmanſhip; but thoſe who make them amount to eleven thouſand, muſt include in the computation every particular figure in the hiſtory-pieces, and all thoſe ſmall ones that are frequently placed about the larger ſtatues.

THE Cathedral of Florence is one of the moſt ſuperb and beautiful ſtructures in Europe, the walls and pavement being of marble of various colours. It is four hundred and eighty feet long, and three hundred and eighty feet high to the top of the croſs. The cupola is lofty and of a vaſt circumference, being the firſt of the kind that ever was built in Europe, from whence St. Peter's at Rome was copied. The painting on the inſide of it repreſents the Reſurrection and the Laſt Judgment: and the body of the church is likewiſe adorned with the fineſt paintings, ſculptures, and a vaſt number of ſtately monuments. The bell-tower or ſteeple, detached from the church, is much admired, being a hundred and eighty feet high, all of fine marble of ſeveral colours, and adorned with a great variety of curious carvings and figures. The Baptiſtery, which ſtands before the church, was anciently a temple of Mars, and is now remarkable for its three brazen gates, on which ſeveral pieces of ſcripture-hiſtory are ſo exquiſitely repreſented in baſs-relief, that Michael Angelo uſed to ſay, "They were worthy of being the gates of Paradiſe *.

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* Theſe gates were the work of Laurentio Cion, and took him up fifty years in finiſhing. Biſhop Burnet ſays, they are the beſt of the kind in the world, and adds, that the hiſtories are repreſented with ſo much exactneſs, the work is ſo natural, and yet ſo fine, that a curious man might find entertainment for many days, if he would examine them with a critical nicety.

HERE we cannot forbear taking notice of the Chapel of St. Laurence (adjoining to the collegiate church of the ſame name) which is the burial-place of the Medicean family, and is univerſally allowed to be the fineſt and moſt coſtly piece of work in the whole world. This chapel is an octogon, having a ſpacious cupola for its roof, and its walls are incruſted with jaſper, agate, lapis lazuli, oriental alabaſter, and other rich materials. All round it are the tombs of the great dukes of Tuſcany, compoſed of porphyry, granite, and the moſt precious marbles; and on each tomb is a column of jaſper, with a ducal crown on the top of it, enriched with variety of jewels. Above theſe tombs the ſtatues of the great dukes are placed in niches, all of braſs gilt, and large as the life. In the middle of each face of the octogon riſes a double pilaſter of jaſper, and on the pedeſtal of each are ſeveral emblematical figures, curiouſly wrought with precious ſtones. The pavement is of the fineſt marble, and the roof adorned with lapis lazuli of the brighteſt blue, and ſpangled with ſtars and veins of gold. This ſplendid and ſumptuous ſtructure was begun above a hundred years ago, but is not yet finiſhed, tho' it has already coſt many millions ſterling.

THE Cathedral of Piſa is one of the moſt regular, beautiful, and lightſome pieces of Gothic building to be ſeen in Europe. The choir is of the fineſt marble, and the roof is ſupported by eighty columns of the ſame ſtone, all of one ſolid piece, being part of the ſpoils taken by the Piſans in their eaſtern expeditions, when the Republic was in a flouriſhing condition. The pavement is of marble, of different colours, curiouſly intermixt; and the paintings, eſpecially of the choir, are done by the greateſt maſters. The three gates of this church, which are of braſs, are exquiſitely wrought with the hiſtory of our Saviour's birth, life and paſſion. The Babtiſtery is a fine marble ſtructure, ſhaped like the cupola of St. Peter's at Rome, and ſupported by beautiful pillars. But we muſt not forget the celebrated leaning tower or ſteeple, which is of a round form, a hundred and eighty-eight feet high, and was built ſo on purpoſe (as ſome ſay) to ſhew the ſkill of the architect. Others affirm, that it only deceives the eye, and is really upright; but the truth is, one part of the foundation ſunk ſoon after the tower was built, whence it acquired that inclination ſo much talked of, which is not only viſible to the eye, but has been often proved by letting down a line and plummet from the top to the bottom.

AMONGST the Cathedrals of Italy, that of Sienna in particular deſerves our attention, which is really a maſter-piece in the Gothic kind, and may be viewed with pleaſure after St. Peter's itſelf. The walls, both within and without, are faced with marble of different colours; and the roof is azure, ſprinkled with ſtars of gold. The portico of this church is very magnificent; and the whole fabric is adorned with variety of excellent ſtatues, buſts, &c. and particularly with the heads of above a hundred and ſeventy popes in alabaſter. The windows are formed by a multitude of little pillars retiring one behind another, and the large columns are carved with fruit and foliage from the bottom to the very top. But above all, the pavement of the church is exquiſitely fine, being compoſed of marble of various colours, forming a ſort of moſaic work, wherein is repreſented in a moſt lively manner the ſtory of Abraham going to ſacrifice his ſon, the paſſage of the Iſraelites through the Red Sea, and other hiſtories of the Old Teſtament. In order to preſerve this beautiful work, they cover it with boards, which are eaſily taken up to ſatisfy the curioſity of ſtrangers.

IT might perhaps be thought a blameable omiſſion, if we ſhould ſay nothing of the famous church of St. Mark in Venice, which is built after the Grecian manner, almoſt ſquare, and covered with four domes or cupolas; but it is neither very large nor lofty. The whole is ſupported by thirty-ſix pillars of fine marble, a beautiful baluſtrade runs round the top of it, and the frontiſpiece is adorned with columns of porphyry and jaſper. The high altar is a maſter-piece of its kind, and the back of it is embelliſhed with a vaſt number of curious pictures, enamelled after the Grecian taſte, ſet in gold, and enriched with precious ſtones. The great quantity of moſaic work, with which the roof and pavement of this church is adorned, is very much admired, having now laſted near ſeven hundred years without any diminution of its beauty.

To the churches already deſcribed we ſhall only add the cathedral of Loretto, which is a moſt magnificent fabric, built in the form of a croſs, and adorned with a vaſt variety of ſtatues and paintings by the greateſt maſters. The cupola is a bold and lofty one, ſupported by twelve ſtately pillars, which are covered with paintings; and the doors of the church, which are ſaid to be of Corinthian braſs *, are curiouſly wrought with baſs-reliefs,

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* This famous metal is ſaid to have been formed from the immenſe quantities of gold, ſilver, and copper, that were melted and run together by the violence of the conflagration, when

reliefs, repreſenting ſeveral pieces of ſcripture hiſtory. But this church is moſt famous for the Santa Caſa, or Holy Houſe, which ſtands in the middle of it, and occaſions a vaſt reſort of pilgrims from all parts of Europe *. This houſe or apartment is about thirty feet long and thirteen broad, and the walls appear to be of brick, cemented with common lime and ſand; but as to the roof and pavement, they are acknowledged to be of modern workmanſhip. At the weſt end of it is a little window; and at the eaſt end, over the chimney, is placed a cedar-ſtatue of the Virgin, holding the infant Jeſus in her right arm. The ſtatue is about four feet high, and uſually adorned with a mantle of gold brocade embroidered with precious ſtones; and on its breaſt hangs a rich fleece of jewels, with a collar and croſs of the ſame materials. But the moſt ſplendid and coſtly of all the Virgin's array is her triple crown, which, with a little one for her child, was preſented to her by Lewis XIII. of France. They are

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when L. Mummius ſacked and burnt the city of Corinth, 146 years before the birth of our Saviour.——Thoſe who ſpeak of it accurately, diſtinguiſh it into three kinds: in the firſt, gold was the prevailing metal; in the ſecond, ſilver; and in the third, gold, ſilver and copper were equally blended.

* We ſhall not trouble the reader with a long hiſtory of this Holy Houſe, but only inform him, that it is ſaid to be the ſame in which the Bleſſed Virgin was born, where ſhe received the ſalutation of the angel, and brought up her ſon Jeſus till he was twelve years of age: that when the Turks became maſters of the Holy Land, it was tranſlated from Nazareth into Dalmatia by angels, who afterwards carried it croſs the Adriatic into the territory of Recanati, a few miles from Loretto; from whence they ſoon removed it a third time, and laſtly fixed it in its preſent ſituation. To do honour to this houſe the ſtately church was built, in which it now remains incloſed.

are both of maſſy gold, and are enriched with diamonds of immenſe value, which dazzle the eyes of the beholders. Round the niche, wherein the ſtatue is placed, a row of precious ſtones of different kinds is ſo diſpoſed, as to form a ſort of rainbow of various colours. Twelve lamps of maſſy gold, ſaid to weigh thirty-ſeven pounds each, hang before the ſtatue; and before the altar hangs one of a much larger ſize, remarkable for the excellency of the workmanſhip, which was a preſent from the Republic of Venice. This altar is of pure beaten ſilver, preſented by one of the dukes of Tuſcany.—As to the treaſury of this celebrated place, it is filled with riches ſurpaſſing all imagination. It is a long room or gallery, with a vaulted roof adorned with excellent paintings; on one ſide whereof are ſeventeen or eighteen large preſſes with folding-doors, the repoſitories of gold, diamonds, and whatever elſe is valuable, being the offerings of emperors, kings, princes, &c. for ſeveral ages paſt. Silver (as Mr. Addiſon obſerves) can ſcarce find admiſſion here, and gold looks but poorly among ſuch an incredible number of precious ſtones. It is ſurpriſing to ſee the coſtly ſervices for the altar, conſiſting of lapis lazuli, amber, agate, coral and cryſtal. In one preſs there is a ſpread-eagle covered with diamonds; in another, the images of our Saviour and the Samaritan woman in gold; and there is an altar-cloth enriched with jewels, valued at a hundred and forty thouſand crowns. In this treaſury are likewiſe kept the rich habits of the Virgin, of which ſhe has a change at leaſt for every day in the year. — But it would be endleſs to enumerate all the valuable curioſities that are heaped up here from all parts of Chriſtendom; and having ſaid enough of the ſacred ſtructures, we proceed to give a brief account of ſome of the fineſt palaces in Italy.

We ſhall begin with the Pope's palace of the Vatican, his uſual reſidence, at leaſt in winter; which, if not the moſt beautiful, is in ſome reſpects the moſt celebrated in Europe. It ſtands near St. Peter's church, and is a very large and lofty building, but extremely irregular; or rather it may be reckoned a heap of good pieces of architecture ill joined together. Some affirm that it contains above twelve thouſand rooms, cloſets, &c. but of this we can ſay nothing with certainty, though perhaps the conjecture is not much beyond the truth. It is ſufficient to ſay in general that it is a palace fit for the greateſt monarch upon earth; and though the outſide has nothing that raiſes our admiration, the inſide makes us ample amends, for we are aſtoniſhed at the grandeur of the apartments and the beauty of the paintings, wherein the greateſt maſters of Italy have diſplayed their art. In the great hall, or Sala Regia, where the Pope gives audience to ambaſſadors, there is an admirable piece of the celebrated Raphael's, repreſenting Leo in his pontifical habit, meeting Attila king of the Huns; and Michael Angelo has outdone himſelf in the Converſion of St. Paul. The ſame hand has inimitably drawn the Laſt Judgment in a chapel adjoining to this hall, which is likewiſe admired for the beauty of its ſtructure. The Pleaſure-houſe, called the Belvidere, abounds alſo with excellent paintings, and its gardens are very delightful, being laid out in pleaſant walks, and adorned with fountains, caſcades, grottos, &c. together with a great variety of antique ſtatues, many of them of excellent workmanſhip, particularly that of Venus coming out of a bath, a dying Cleopatra, and Laocoon with his two ſons and ſerpents twiſting about them, cut out of one block of marble. But the famous library, with the building that contains it, engages the attention of a ſtranger more than all the other beauties of the Vatican. The ſtructure is finely painted both within and without, and the library itſelf is perhaps the nobleſt collection in the world, both of printed books and manuſcripts, eſpecially the latter, having been much augmented by the library of the Elector Palatine from Heidelberg, that of the duke of Urbino, and that of Chriſtina Queen of Sweden. A Hebrew Bible, the Four Goſpels written by the hand of St. Chryſoſtom, a Virgil and a Terence about fourteen hundred years old, are to be ſeen amongſt the ancient manuſcripts; of which indeed there is a ſurprizing number, in Hebrew, Greek, Latin, Arabic, Chaldean, and ſeveral other languages, ſome of them remarkable for the curious manner in which they are written, and others for their ſcarcity and antiquity.

It would take up too much time to deſcribe the other palaces belonging to the Pope, or to the noble families in Rome, ſeveral of which are exceeding beautiful and magnificent. From this city therefore let us ſtep to Florence, and take a view of the ſtately palace of Pitti, the uſual reſidence of the great dukes of Tuſcany. This New Palace, as it is called, is built in the Ruſtic manner, which, as well as the Tuſcan order, owes its original to this country. The front towards the ſtreet has a range of twenty-two large windows in each ſtory, with fine pillars on the ſides of them, and other proper ornaments; but the court or area within is ſo ſmall, that one cannot ſtand in it conveniently to view the building to the beſt advantage. The beſt front is next the gardens, where the columns of the firſt ſtory are of the Doric order, thoſe of the middle Ionic, and the third Corinthian. The duke's apartments are very richly furniſhed, and adorned with exquiſite paintings; but nothing in Florence is ſo much admired as the famous gallery of the old palace, which is filled with a collection of pictures and ſtatues perhaps the moſt curious and valuable in the world. One ſide of the gallery is a continued window, under which are ranged fine marble ſtatues of the Roman emperors and ancient heroes, and above it are the pictures of the moſt learned men of different ages and countries. The oppoſite ſide is covered with the pictures of the Medicean family, and thoſe of the moſt celebrated generals, ancient and modern. Amongſt the buſts of the emperors are thoſe of Caligula, Otho, Pertinax, and ſeveral others, which are uncommon, and almoſt ſingular in their kind; and many of thoſe which are more common deſerve particular notice for the excellence of the ſculpture, as thoſe of Auguſtus, Veſpaſian, and Marcus Aurelius. There is alſo an admirable buſt of Alexander the Great looking up to Heaven, in whoſe countenance the ſculptor ſeems to have expreſſed his concern for want of new worlds to conquer. The entire figure of a veſtal virgin, with the ſacred fire burning before her, is a curious piece of antiquity; and ſo is a Morpheous in touch-ſtone *, being the figure of a boy aſleep with a bundle of poppies in his hand, in which manner that deity is uſually

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* This is a black, ſmooth, gloſſy kind of marble, formerly found in Lydia and Ethiopia, and called by the ancients Lapis Lydius and Baſaltes. According to Pliny, the famed ſtatue of Memnon at Thebes was made of this ſtone, and moſt of the antique Egyptian figures are apparently of the ſame. It is called Touch-ſtone by the moderns, as being uſed in trying the goodneſs of gold and ſilver.

repreſented by ancient ſtatuaries. There are likewiſe in this gallery a Narciſſus, a Flora, a Gladiator, and many other ſtatues, to the number of three hundred or upwards, valuable for their antiquity and excellent workmanſhip.—Nor is this all: there are ſix or ſeven rooms adjoining to the gallery, which are filled with all manner of curioſities. One of them contains a collection of idols, ſepulchral lamps, taliſmans *, medals, and other antiquities of the like nature. Another, called the Mathematical Chamber, has a globe and ſphere, each of them ſeven feet in diameter; and a third is covered with the fineſt paintings. But the moſt valuable things are kept in a room that is commonly ſhewn laſt to ſtrangers, over which is a little dome or cupola lined with mother of pearl, and the floor is inlaid with marble of various colours. Here is the famous large diamond, weighing 139 carats, and reckoned worth about 200,000 l. ſterling. Here is alſo a cabinet full of veſſels of agate, cornelian, porphyry, coral, rock-chryſtal, &c. and a large table inlaid with oriental jaſper, rubies, topazes, and other precious ſtones. This room likewiſe contains a great variety of ſelect pictures and ſtatues, and amongſt the latter is the celebrated one of Venus,

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* Taliſmans are the figures of the heavenly ſigns, conſtellations, or planets, engraven on ſtone or metal, to which ſome aſtrologers aſcribe wonderful virtues, particularly that of drawing down the influence of the celeſtial bodies. There are alſo magical taliſmans, which bear very extraordinary figures, with ſuperſtitious words and names of angels. The ancient taliſmans of the Samothracians were pieces of iron formed into images and ſet in rings, which were reckoned preſervatives againſt all evils. Some rabbins maintain, that the braſen ſerpent, raiſed by Moſes in the wilderneſs, was a taliſman.

nus, (commonly called Venus of Medicis) the delicate ſhape and beauty whereof charm every ſpectator, and are confeſſedly beyond deſcription.

HERE it may not be amiſs to take notice of one of the duke's country-palaces, called Pratolino, not ſo much on account of the ſtructure itſelf, (though very grand and beautiful) as to give the reader a ſpecimen of the fine water-works of the Italians, which are no where ſeen in greater perfection than in the gardens of this ducal Villa. Here is a noble grotto, of which the roof alone is ſaid to have coſt thirty thouſand ducats, being all of coral, mother of pearl, and other coſtly materials. The walls are lined with the ſame, and the pilaſters are adorned with an organ, which by means of water plays ſeveral tunes *, whilſt the god Pan joins his pipe to the muſick, and is anſwered by the warbling of a great variety of artificial birds. In the baſon there is a large dolphin carrying a naked woman on his back, and ſwimming about, with ſeveral other figures, all moving as if alive. In another grotto Galatea comes out of a door in a ſea-chariot, and returns again the ſame way, after having ſailed a while upon

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* Hydraulic Organs, which play by means of water, are to be ſeen in ſeveral grottos in Italy, from whence they have been introduced into France and ſome other countries. The invention however is not modern; for Cteſibus of Alexandria, who lived in the reign of Ptolemy Euergetes, is ſaid to have firſt contrived organs that played by compreſſing the air with water, as is ſtill practiſed. Archimedes and Vitruvius have left us deſcriptions of the hydraulic organ; and we find the figure of one on the reverſe of a large medallion of Valentinian, with two men, one on the right, the other on the left, ſeeming to pump the water which plays it, and to liſten to its ſound. It conſiſts of eight pipes, placed on a round pedeſtal.

the water. In one place an angel gives us a tune upon a trumpet; in another a clown carries a diſh of water to a ſerpent, who lifts up his head and drinks it: here ſmiths are at work, there mills are going; and a great many other curioſities of this kind, all moved by water, may be ſeen in the grottos of theſe delightful gardens.

THERE are ſeveral beautiful lakes in the dutchy of Milan, the principal of which is Lago di Locarno, or Lago Maggiore, which is ſixty-five Italian miles in length, and in moſt places ſix broad. It is every where environed with hills, covered with vineyards, and plantations of cheſnut-trees; and along the banks are fine rows of trees and walks, arched with vine branches. This beautiful proſpect is heightened by large natural caſcades falling from the mountains. In this lake are the two celebrated iſlands, Iſola Madre, and Iſola Bella, the former belonging to count Boromeo, and the latter to the emperor. Theſe two iſlands have been compared to two pyramids of ſweatmeats, adorned with green feſtoons and flowers. At one end of the garden of the Iſola Bella, are ten terraces, the perpendicular height of which, taken together, is ſixty German ells above the height of the water. Theſe terraces decreaſe proportionably in their circuit, as they riſe towards the top of the hill, where an oblong area, paved with fine ſtone, and ſurrounded with a balluſtrade, affords a moſt delightful proſpect. It is in length from forty-five to fifty common paces; and on every ſide ſtands a range of marble ſtatues of a gigantic ſize. Round every terrace is a pleaſant walk, and at the four angles, are large ſtatues and pyramids placed alternately. The Iſola Bella was no longer ago than the middle of the laſt century, only a barren rock, to which every baſket of earth, and whatever is found there, muſt have been brought at a prodigious expence. The garden of Iſola Bella has on the ſouth two round towers, in which are very lofty apartments adorned with red and black marble, with a covered gallery, ſupported by ſtone columns, and ſhaded with lemon trees. Towards the eaſt is a delightful walk of large orange trees, diſpoſed in four or five rows, with a grove of olives, and a caſcade that falls down about twenty ſteps. In the palace is a multitude of fine paintings, vaſes, buſts, and other curioſities; and on going from the houſe towards the garden, the ſmell is immediately refreſhed with the mingled odours of fruits and flowers. The firſt contre-eſpalier, conſiſts of bergamot, lemon, and citron trees; next to this appears a high range of orange trees, beyond which you come to a lofty grotto, adorned with ſtatues, and water-works. Over its centre is an unicorn of an enormous ſize, in a ſpringing attitude, with a Cupid on his back.

THE other iſland named Iſola Madre has ſeven terraces, which are high, but ſloping. This is alſo formed into a beautiful garden, from its being originally no more than a high perpendicular rock, and likewiſe contains a palace, adorned with paintings. The garden abounds with beauties, particularly eſpaliers of citron and orange trees, groves of cedar, laurel, ſtatues and other decorations. It contains a great number of pheaſants, and recalls to one's mind the fabulous deſcriptions that have been given of enchanted groves and iſlands. The ſhores of both iſlands are ſet round with painted flower-pots; and when any foreign prince comes in the night, or makes ſome ſtay here, both the iſlands are illuminated with lights of all colours, which exhibit a very glorious ſpectacle.

PERHAPS we have dwelt too long on the ſubject of buildings, but we cannot leave it without mentioning a nobleman's ſeat about two miles from Milan, which produces ſuch a ſurprizing echo as can ſcarce be equalled in the world *. Mr. Addiſon tells us, that upon firing a piſtol he had the ſound returned fifty-ſix times, though the air was then foggy, and therefore not proper for making the experiment to the beſt advantage. At firſt the repetitions were very quick, but the

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* This echo is of the multiple or tautological kind, returning one ſound ſeveral times ſucceſſively, ſo as to make one clap of the hands ſeem like many, one ha like a laughter, or one inſtrument like ſeveral of the ſame kind, imitating each other: and by placing certain echoing bodies in ſuch a manner that any note played ſhall be returned in thirds, fifths, and eighths, a muſical room may be ſo contrived, that not only one violin played therein ſhall ſeem many of the ſame ſort and ſize, but even a concert of different inſtruments.—Thoſe echoes which return the voice but once are called ſingle; whereof ſome are tonical, only returning a voice when modulated into ſome particular muſical tone. Others, that repeat many ſyllables or words, are termed polyſyllabical; of which kind is the fine echo in Woodſtock park, which Dr. Plott aſſures us will return ſeventeen ſyllables diſtinctly in the day-time, and in the night twenty. Barthius likewiſe, in his notes on Statius's Thebais, mentions an echo near Bingen in Germany, which would repeat words ſeventeen times, as he himſelf had proved; and what is very ſtrange in this echo, the perſon who ſpeaks is ſcarce heard at all, but the repetition moſt clearly, and always in ſurprizing varieties, the echo ſeeming ſometimes to approach nearer, and ſometimes to retire to a greater diſtance.—Vitruvius tells us, that in ſeveral parts of Greece and Italy there were brazen veſſels artfully ranged under the ſeats of the theatres, to render the ſound of the actors voices more clear, and make a kind of echo; by which means, of the prodigious number of perſons preſent, every one might hear with eaſe and pleaſure.

internals

intervals were greater in proportion as the ſound decayed. Nothing like ſuch an echo, it ſeems, was deſigned by the architect, but it is occaſioned by two parallel walls of a conſiderable length, between which the ſound is reverberated from one to the other till the undulation is quite ſpent. Others tell us, that the ſound of one muſical inſtrument in this place will ſeem like a great number of inſtruments playing together in concert.

We ſhall conclude this article with a ſhort deſcription of the famous bridge at Venice called the Rialto, which is allowed on all hands to be one of the fineſt in Europe. It was built in the year 1591, on the deſign of the celebrated Michael Angelo, and is ſaid to have coſt 250,000 ducats. It conſiſts of one ſingle arch, all of marble, has rails on each ſide, and two rows of ſhops in the middle. The Dimenſions of this bridge are as follows: the compaſs of the arch is juſt one third part of a circle; the width of it on the level of the water, from one extremity to the other, is ninety-five feet, and the height of it twenty-four. —Many other fine ſtructures of this kind might be mentioned, but leſt we ſhould tire the reader, and exceed our limits, we muſt proceed to another ſubject.

Of the ITALIANS.

IT has been obſerved by Mr. Addiſon, Dr. Buſching, and other authors of great reputation, that, if we conſider that the Pope's dominions conſiſt, in general, of a very fertile and excellent ſoil; that his harbours, both on the Mediterranean and the Adriatic, are advantageouſly ſituated for trade; that he receives conſiderable ſums from Spain, Germany, and other countries belonging to foreign princes, which might be ſuppoſed to enable him to eaſe his own ſubjects; that his country is viſited by a multitude of foreigners, who ſpend a great deal of money in it; and that on account of the ſuppoſed ſacredneſs of his perſon and character, his government ſhould ſeem beſt calculated for the welfare of ſubjects; and on conſidering alſo the long peace that has reigned in Italy, any one would be apt to imagine, that this country could not fail of being extremely flouriſhing; but upon the ſlighteſt inſpection, we muſt ſee that this is far from being the caſe. The country is very ill cultivated, poor, and thin of inhabitants, the city of Bologna above excepted. Manufactures and trade are ſtagnated; and did not the bounty of Providence furniſh the inhabitants with figs, dates, almonds, olives, and other fruits, which grow without culture, their indolence would abſolutely ſtarve them. Their wanting the ſpirit of induſtry, is the leſs wonderful, as they are conſcious that if they acquire much, much will be taken from them. The many holidays, which are an impediment to trade and buſineſs; and the multitude of young ſturdy beggars, ſtrolling about under the title of pilgrims, inſtead of increaſing the common ſtock, by their labour and induſtry, lie as a dead weight on their fellow-ſubjects; and conſume that charity which ought to ſupport the aged, the ſick, and decrepid. The many convents, which are neſts of drones, that prevent the increaſe of inhabitants, the inconceivable wealth in the churches and convents, lying dormant, without the leaſt advantage to the public; and the inquiſition, which will not permit the want of inhabitants to be ſupplied by thoſe of any other religion, are ſome of the great cauſes of the wretched condition of the papal dominions.

But there are others attended with ſtill more fatal conſequences: no Chriſtian government, equals in rigour the papal, which wields both the temporal and ſpiritual ſword. Nothing is ſo monſtrous as the paſſion by which moſt Popes, Cardinals, and other great Prelates, have ſhewn for enriching their nephews and relations, and nothing ſo vain as the ambition of gaining a great name by the founding of churches and convents. The regulars vie with each other in the number, ſplendor, and riches of their religious houſes and churches, while the money is generally extracted from the bowels of the poor inhabitants for the ſupport of their frivolous rivalſhip. On conſidering theſe various cauſes, we ſhall be no longer ſurprized, that there is in no part of Europe, a people more wretched than the Pope's temporal ſubjects.

EVERY country has perhaps ſome vices, to which the inhabitants are peculiarly addicted; and it is maintained by travellers of the greateſt reputation, that in Italy murder is conſidered in a very different light from what it is in other countries. If a robbery be committed in the ſtreets or market places, in any of the towns of this country, and the people are called to ſtop the thief, there is always aſſiſtance at hand to purſue the criminal; but upon crying murder, no body offers to ſtir, and the aſſaſſin ſaves himſelf by flying unmoleſted to a church, convent, or other aſylum, where the villain receives all poſſible aſſiſtance to enable him to eſcape the hands of the civil power. "I remember, ſays Mr. Keyſler, a "poſtilion, who once drove me, was treache"rouſly ſtabbed at the poſt houſe of Piſtoia; and "though the fact was committed in the preſence "of more than ten perſons, not one of them "ſtirred a foot to ſeize or purſue the murderer."

YET it muſt be confeſſed that the Italians are polite, affable, and ingenious; they endeavour to recommend themſelves by their wiſdom, obſerving a juſt medium between the ſtately gravity of the Spaniards, and the airy levity of the French. They have a warm ſenſe of gratitude, and upon all occaſions are ready and willing to return an obligation, tho' ever ſo ſmall; but on the other hand, they are jealous and revengeful. They are extremely nice in all the punctilios of civility, and no people are more profuſe of ſtrained compliments and pompous titles; never reflecting upon perſons, either preſent or abſent.

THE nobility and gentry uſually laviſh their money on magnificent houſes, paintings, ſtatues, and gardens embelliſhed with the greateſt art; but are not attentive to rural beauties, which are neglected. They pay little regard to a ſplendid table, and the indulgence of the luxuries common in the reſt of Europe. They uſually ſleep about two hours after dinner, which is but a ſlight meal, in compariſon with their ſuppers. Theſe laſt, they begin with roaſt meats, and end with ſoups. Boiled ſnails, fried in oil, or ſerved up with oil and pepper, and the hinder part of frogs are eſteemed delicacies; and many ſorts of fowl are here eaten by the great, which the poor, among us, would hardly touch, as kites, magpies, hawks, and jackdaws.

AS the eccleſiaſtical day throughout the whole Chriſtian world begins at midnight, it is very extraordinary that the civil day ſhould not commence at Rome with the eccleſiaſtical, and that Italy alone ſhould, in this particular, differ from all the reſt of Europe. The Italians begin counting the hours in a ſeries of twenty-four, from the end of the day, an equivocal time impoſſible to be determined; hence, at Rome, and almoſt throughout all Italy, they count every day at noon, different from the day before. At Rome, in the ſolſtice of June, the clock ſtrikes ſixteen at the hour of noon; but in the winter ſolſtice in December, nineteen. As the length of the day, eſpecially when taken from the twilight of the evening before, to that of the next day, differs from one day to another, ſeveral minutes, in order to avoid every day meddling with their clocks, they have conceived, that they ought to wait till the difference ſhould amount to about fifteen minutes; and that they may act conformably to this regulation, all the clocks of the city make a ſkip of a quarter of an hour on a day appointed, ſometimes at the end of eight days, ſometimes at the end of fifteen, and ſometimes after an interval of ſix weeks. For this purpoſe a printed almanack informs us, that from the ſixteenth of February, for inſtance, to the twenty-fourth, it will be noon at a quarter paſt eighteen; but that on the twenty-fourth, it will be noon at eighteen o'clock, preciſely, and continue ſo till the ſixth of March, &c. That from the firſt of June till the thirteenth of July, the hour of noon is to be reckoned at ſixteen o'clock; on the thirteenth of July, at ſixteen and a quarter; and ſo on through the reſt of the months, inſomuch, that in the ſpace of a whole year, the time of noon varies from fifteen to eighteen; and that not by an inſenſible progreſſion from one day to another, but by ſkipping a quarter of an hour between a fixed day, and the day after, at the end of eight or fifteen, and ſometimes after an uniform march of forty days. However, the emperor, in his Tuſcan territories, and the infant duke of Parma, in his, have within theſe few years ordered, that the hours there ſhould be reckoned conformably to the cuſtom univerſally received throughout the reſt of Europe.

ONE of the amuſements of Rome is horſe-races, a diverſion known no where but in the dominions of Great Britain and Italy; but the difference in which this is performed, is very great. In Italy, inſtead of being under the management of their riders, they are trained up to run alone; on the ſides, and along the back, they have leathern ſtraps, ſtuck on with pitch, and under theſe are iron bullets encompaſſed with ſtrong points, like the rowels of a ſpur, which continually prick the horſes while they are in motion, and they cruelly ſtick one of theſe prickly balls under the horſe's tail. The ſtarting place, is in a ſquare called Piazza del Popolo, where the horſes, being generally from five to eight in number, ſhew the utmoſt impatience for the ſignal, which is given by dropping a rope that runs acroſs the courſe before them. Upon this they ſtart, and fly along the ſtreet called Corſo, with incredible ſwiftneſs, the coaches being drawn up on each ſide. The prize is generally a piece of brocade worth ſeventy or eighty Roman crowns.

NOTWITHSTANDING the many magnificent buildings, with which this city is adorned, the people have the diſagreeable cuſtom of drying linen by hanging it out of the windows, and on ropes hung acroſs the ſtreet.

THE city of Venice has ſeveral ceremonies and cuſtoms peculiar to itſelf; the moſt ſingular of which is the Doge's marrying the ſea on Aſcenſion-day. In the morning three hundred ſenators, repairing to the ducal palace in their ſcarlet robes, accompany the Doge in all his formalities to the Bucentaur or State Gallery, attended by the Pope's Nuncio on his right hand, and the

Patriarch of the city on his left; the ſenators follow; and being ſeated in their places, the admiral, who ſits at the helm, makes a ſignal, upon which the muſic ſtrikes up, and the ſlaves begin to row the veſſel, amidſt the firing of great guns and the ringing of bells. The Bucentaur is followed by ſeveral thouſand barks and gondolas, a great number of galleys finely ornamented, and the ſplendid yatchts of the foreign Ambaſſadors; and being arrived at a ſmall iſland, about two miles from the city, the Patriarch pours ſome holy water into the ſea, and then the Doge, through an aperture near his ſeat, drops into it a gold ring, ſaying in Latin, We eſpouſe thee, O ſea, in token of our real and perpetual dominion over thee. This ceremony is no ſooner performed, than the barges tack about, and row to the church of St. Nicholas in a neighbouring iſland, where the Patriarch in perſon celebrates a ſolemn maſs; after which they return in the ſame pompous manner, to the ducal palace, where the company is magnificently entertained. This whimſical privilege of marrying the ſea, was granted the republic by Pope Alexander the Third, for their good offices in raiſing him to the Pontifical dignity. The ſolemnity of the day is concluded, by a rowing match between all the barges and gondolas that accompany the Doge in the morning, in which they row againſt one another with ſuch force, that many of them are overſet, and turn keel upwards.

THE Carnaval always begins at Venice on the ſecond holiday in Chriſtmas, and laſts till Lent, during which time there is an univerſal change of dreſs, cuſtoms, and laws. The faces of every body are concealed under a whimſical variety of maſks: the play-houſes and gaming-houſes are open, all marks of diſtinction are ſet aſide, and all move and act upon an equal footing. Ceremony, conſtraint, care, buſineſs, and even modeſty and decorum, ſeem baniſhed from ſociety, to give place to joy, liberty, folly and licentiouſneſs. The piazza of St. Mark, and the other moſt public parts of the city, are filled with toy-ſhops, and the ſtages of jugglers, tumblers, rope-dancers, puppet-ſhews, mountebanks, and fortune-tellers; and the whole city is crowded with courtezans from all parts of Italy. The plays and operas are the fineſt part of the diverſions of the ſeaſon; but the cuſtom of going maſked gives ſuch a handle to indecent liberties, that decency ſeems totally extinguiſhed. The Ridottos, where they play at baſſet, are opened at the ſame time, and ten or twelve rooms may be ſeen with gaming tables in each, crowded with ladies of quality, gameſters, and courtezans. They have likewiſe certain rooms where ſweetmeats and liquors are ſold. Every perſon thus maſked, provided he be well dreſſed, has the liberty of talking to the ladies of the higheſt quality, for nobody, not even the huſband himſelf, takes notice at that time of what is ſaid to his wife, the maſk being eſteemed ſacred.

THE Carnaval at Rome affords a more agreeable entertainment to perſons of an elegant taſte than that of Venice; and ſhould a proſtitute dare to appear in the fine ſtreet called the Corſo, her being diſcovered would expoſe her to very ſevere treatment.

AMONG the public entertainments at Naples, one of the moſt extraordinary is the proceſſion with four triumphal cars, on the four Sundays immediately preceding Lent; the firſt with bread, the ſecond with fleſh, the third with vegetables, and the fourth with fiſh. Theſe proviſions are piled up very high with muſicians placed at the top, and guarded by armed men, till the populace are allowed to plunder them.

BUT what draws the greateſt concourſe to Naples, is a caſtle, built according to the rules of fortification, and faced all over with pieces of beef, bacon, hams, geeſe, turkeys, and other proviſions. This welcome ſpectacle is exhibited once a year, and on each ſide of the caſtle is a fountain running with wine, during the whole day. A party of ſoldiers is poſted to reſtrain the ardour of the populace till the appearance of the Viceroy in his balcony, which is the ſignal for the aſſault.

ALMOST every day is exhibited at Naples, a proceſſion intended leſs to excite devotion, than to raiſe a fund for penitent proſtitutes, who having quitted their abandoned way of life, have entered a convent; in order, the more effectually to excite the charity of the ſpectators, they ſelect, the moſt beautiful of theſe penitents, who walk two abreaſt, bare-footed through the city, kneeling down at particular places, where they acknowledge their paſt wickedneſs, and ſing penitential hymns, while an eccleſiaſtic and a lay aſſiſtant, receive the contributions of the people, in a purſe faſtened to the end of a ſtick. On theſe occaſions, they wear a violet coloured gown, tied round the waiſt with a cord of the ſame colour. Their heads are ſhaved, and covered with a blue veil, ſo thin, as to afford a ſight of the charms of youth and beauty, which are always powerful incentives to a liberal contribution.

IT is proper to mention among the peculiarities of Naples, the manner of furniſhing that city with ſnow, which is uſed there inſtead of ice, becauſe it is ſuppoſed to cool any liquor ſooner. There is a ſurprizing quantity of it annually conſumed; for in hot weather, they drink very few liquors, and not even water without it: thus it is uſed by every body, from the higheſt to the loweſt, and is in a manner conſidered as one of the neceſſaries of life; ſo that a ſcarcity of ſnow would occaſion a mutiny as much as a dearth of corn in any other country. To prevent this, the king of Spain ſold the monopoly of it to certain perſons, who are obliged to furniſh the city with it all the year round, at ſo much the pound. For this purpoſe, they make uſe of a high mountain at about eighteen miles diſtance, in which they have ſeveral pits. There they employ many poor people, at the proper ſeaſon of the year, to roll in vaſt balls of ſnow, which they ram together, and cover from the ſun. Out of theſe reſervoirs of ſnow, they cut lumps as they have occaſion for them, and ſend them on aſſes to the ſea-ſide, where they are carried off in boats, and diſtributed to ſeveral ſhops, at a ſettled price, from which the whole city of Naples is ſupplied.

ARTS, MANUFACTURES, &c.

OF all the manufactures of Italy, that of ſilk may be reckoned the principal, which employs a vaſt number of hands in Genoa, Milan, Bologna, Venice, Florence, Lucca, Naples, and other cities. Genoa is particularly remarkable for its velvets, gold and ſilver brocades, fine point, (or lace wrought with a needle) and alſo for its paper, of which large quantities have been ſent to England; but the late war, in which the republick was unhappily engaged, has been a great interruption to her commerce and manufactures.

The Artificers of Milan, beſides their wrought ſilks, are famous for their hard wares; and their works in cryſtal, of which they ſometimes make looking-glaſſes eighteen inches long, are very much admired. Breſcia ſeems pretty much to reſemble our Birmingham, being the moſt noted town in Italy for its manufactures of iron and ſteel, eſpecially fire-arms. They alſo make abundance of ſwords, knives, and all ſorts of cutlery-ware; and their manufacture of linen-cloth is not inconſiderable.

The duchy of Parma was formerly famous for its fine cheeſe, called Parmeſan, which was in high requeſt all over Europe; but it is now far outdone by the territory of Lodi, where they breed great numbers of cattle, and make excellent cheeſes of a monſtrous ſize, ſome of them being as big as a mill-ſtone, and weighing above five hundred pounds. The Lodeſan is alſo noted for a fine ſort of earthen ware, not inferior to that of Delft in Holland.

The Venetians for a long time excelled all Europe in the glaſs manufacture, and were eſpecially famed for making the beſt looking-glaſſes in the world; but the Engliſh and French have found out the art of making them to much greater perfection. Their celebrated glaſs-houſes, from whence Europe uſed to be ſupplied, are at a little town called Murano, on an iſland about a mile from Venice; and though the demand they have for this brittle commodity be not near ſo great as formerly, they are ſtill ſuppoſed to vend annually as much as amounts to 200,000 crowns. It muſt be acknowledged they are very dextrous in working the glaſs into all manner of forms, ſuch as ſhips with their guns and rigging, caſtles with their cannon mounted, draw-bridges, gates,

&c. and little organs that will make tolerable muſick.—As to the method of caſting plate-glaſs or looking-glaſs, which is practiſed by the Engliſh and French, it has been deſcribed in a former chapter; and perhaps the reader will not be diſpleaſed to have a ſhort account of the manner of blowing round glaſs, under which name is comprehended our drinking-glaſſes, bottles, bowls, and other veſſels.

When the matter contained in the melting-pots is ſufficiently vitrified, the operator takes his blowing-iron, which is a hollow tube about two foot and a half long, dips it into the pot, and there turns it round; by which means the metal ſticks to the iron, like a glutinous or clammy juice. For each glaſs or veſſel he dips four times, and at each dip rolls the end of his inſtrument, to which the glaſs adheres, on a piece of iron placed over a veſſel of water, the coolneſs whereof more readily conſolidates the glaſs, and diſpoſes it to bind the better with the matter taken out by the next dip of the inſtrument. Having taken up matter enough by theſe dippings, the workman begins to blow gently through the iron, by which he raiſes or lengthens it much like the blowing up a bladder; and to give it a poliſh, he rolls it to and fro on a ſmooth ſtone or marble. This done, he blows a ſecond time, and forms the bunch or belly of the veſſel, the matter aſſuming the figure of a gourd, twelve or eighteen inches in diameter. The blowing is repeated as often as the operator thinks neceſſary; and in order to lengthen and cool the glaſs, he frequently whirls the iron round his Head. When the veſſel is blown into this form, it is ſometimes returned to the fire, where it flattens a little of itſelf; after which it is taken out and cooled, and if the deſign require it, the workman flats its bottom, by preſſing it on the marble, or moulds it in the ſtamp irons. To diſengage the veſſel from the inſtrument, they drop ſome cold water on the collet or neck, which is the narrow part that cleaves to the iron; and this making a ſmall crack, the fracture by a ſlight blow is communicated quite round the collet. This done, they dip an iron rod in the melting-pot, and with the matter that ſticks to it they apply and faſten it to the bottom of the veſſel, which thus ſuſtained, is carried to the great bocca or aperture of the furnace to be heated, where it is left to the care of another perſon, whilſt the former operator reſts and prepares himſelf for the branching. To branch or make the bowl, they thruſt in an iron inſtrument, and the aperture thereby made is widened by a ſecond, which is turned about to give the veſſel its proper form. What is ſuperfluous they cut off with ſhears; and when the veſſel is thus opened, they carry it again to the great bocca, where being ſufficiently heated a ſecond time, the workman puts a finiſhing hand to the bowl by turning it with a circular motion, which he increaſes in proportion as the bowl opens and enlarges. Nothing now remains but to place it in the leer-furnace to anneal and harden*.

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* From this deſcription the reader may form ſome idea of the manner of blowing glaſs veſſels of different kinds, but the dexterity and expedition with which the work is performed can only be conceived by ſeeing the operation. It is really ſurprizing to obſerve, how the melted matter obeys the blaſt of the artiſt; how it ſwells, ſpreads, and forms itſelf into a bottle, a bowl, a cup, or other veſſel; how he turns it and twiſts it, makes it round as a ball, or flat as a wafer; how he cuts it with ſciſſars like a piece of cloth, and in ſhort faſhions

We read of a very ſingular and curious manufacture of what they call Sea Wool or Fiſh Wool, made at Reggio in Calabria, and alſo at Palermo and other towns in Sicily. On thoſe coaſts they take a large kind of muſcle, whoſe ſhell (according to Martiniere) is covered with hair, which being ſoaked and waſhed in freſh water, is carded, ſpun, and knit into ſtockings, caps, gloves, waiſtcoats, and other ſorts of apparel; which, though lighter than ſilk or cotton, are conſiderably warmer. But we rather apprehend (from other accounts) that the ſhell of this fiſh is not hairy, but that the animal ſhoots out a great many fine threads or ſtrings from its tongue, whereby it faſtens itſelf to the rocks or ſand, and of theſe threads the Sicilians form ſtuffs of incomparable beauty.

As it is one part of our deſign to take notice of the moſt remarkable diſcoveries made by the inhabitants of the countries we ſpeak of, it ſeems proper, before we leave Italy, to give a ſhort account

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faſhions it into a thouſand pretty fancies, or into convenient neat vaſes for preſerving liquors, for which purpoſe it ſerves better than the moſt precious metals.—The various uſes of glaſs are almoſt innumerable, but one of the moſt common, and perhaps the moſt ſerviceable of all, is that of making windows to our houſes. Inſtead of ſplitting ſtone into thin Laminæ or plates, in order to render it tranſparent, as was the practice of the ancients; inſtead of uſing canvas or linen, which intercepts our view and hinders the free tranſmiſſion of the light; or inſtead of making lattices, which leaves us expoſed to the cold, wind, and rain; how much more convenient is it (as an ingenious author obſerves) to have windows of glaſs, which, though ſufficiently denſe and compact, to defend us againſt the inclemency of the weather, are ſo pellucid, as to tranſmit to us in the middle of our houſes the chearful blaze of day without any diminution of its luſtre, and to lay open to our ſight the whole proſpect of nature!

count of the diſcovery of America by the famous Chriſtopher Columbus, a native of the ſtate of Genoa, and of the celebrated aſtronomer Galileo.

COLUMBUS, who was well ſkilled in aſtronomy, geography, and navigation, had long formed a reſolution of ſailing in ſearch of a country beyond the Atlantic ocean, and had made application to ſeveral European ſtates and princes, particularly our Henry VII, to grant him ſome ſhips and money to proceed on his intended voyage. After many ſollicitations, he at length obtained the deſired aſſiſtance from Ferdinand and Iſabella, then king and queen of Spain, who provided him with money to fit out three ſmall ſhips for the expedition. This little ſquadron, manned only with ninety men, ſet ſail from Palos in Andaluſia, on the third of Auguſt 1492, arrived at the Canaries the twelfth, and left thoſe iſlands the firſt of September, directing their courſe to the weſtward. But they had not ſailed above a fortnight in this wide ocean before the men began to murmur; for obſerving the wind to ſet conſtantly from eaſt to weſt, they apprehended there would be no poſſibility of returning, and therefore concluded they muſt inevitably periſh if they miſſed the land they were made to expect. Their fears however were in ſome meaſure diſſipated on the nineteenth, when they obſerved ſome birds flying over their ſhips, and ſaw abundance of weeds driving by them on the twenty-ſecond. Having continued their courſe weſtward for ſome time longer, and meeting with no land, the ſeamen began again to mutiny, and were near upon reſolving to throw their admiral over-board, and endeavour to return to Europe; but happily for Columbus, they were once more pacified by ſeeing birds, weeds, and even a ſhrub with berries upon it ſwim by them, which gave them freſh hopes the land was at no great diſtance. Accordingly, on the eleventh of October, about ten at night, the admiral firſt diſcovered a light upon the iſland of Guanahani, or St. Salvador, which laſt name he gave it, in conſideration that the ſight of it delivered him and his men from their fears of periſhing. In the morning the ſhips anchored near the iſland, which the natives beheld with the greateſt aſtoniſhment, whilſt the admiral went aſhore in his boat, and took poſſeſſion of the country in the name of their Catholic majeſties. The poor people were extremely pleaſed with the beads and other toys the Spaniards diſtributed amongſt them, and followed Columbus and his people wherever they went, ſeeming to adore them as if they were come from Heaven. From this iſland they ſailed to Cuba and Hiſpaniola, whence they departed for Europe, and arrived at Palos on the thirteenth of March 1492-3, where a ſolemn proceſſion and thankſgiving was made for their return, and the admiral was received by their Catholic majeſties with the greateſt honours *.—Columbus afterwards made three voyages to this new world, which yet has not taken its name from him, as one might naturally expect it would have done, but from Americ Veſpuſio, a Florentine by birth, who was ſent in 1497 by Emanuel king of Portugal, to continue the diſcoveries begun by Columbus †.

GALILIO,

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* A more particular account of Columbus's voyages may be ſeen in The World diſplayed, Vol. I.

† Though the honour of the firſt diſcovery of America ought undoubtedly to be given to Columbus, we muſt allow a proper ſhare to the ſeveral ſucceeding adventurers, and amongſt the reſt to John Cabot, who was employed by Hen-

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Galilio, one of the moſt celebrated mathematicians, and greateſt geniuſſes of the ſeventeenth century, was the natural ſon of Vinzenzo Galilio, a nobleman of Florence. In his youth, he had an extreme fondneſs for the ſtudy of philoſophy and the mathematics; and made an extraordinary progreſs in the ſciences; whence, in 1592, he was choſen profeſſor of mathematics in the univerſity of Padua; ſoon after which he wrote a treatiſe of mechanics, and ſhewed the manner of finding the alloy of mixed metals, by means of the height of a ſtatical balance. While he was profeſſor at Padua, it is ſaid, that having heard of thoſe glaſſes invented by James Mebius in Holland, by means of which diſtant objects appeared to be brought near, he reflected with ſuch application on the nature of thoſe glaſſes, that without ever having ſeen any of them, he invented the teleſcope. With this inſtrument he was the firſt who diſcovered the four ſatellites of Jupiter, and made obſervations on the Heavens, that will render his name immortal. In 1611, Coſmo II. grand duke of Tuſcany, made him profeſſor of mathematics at Piſa; and ſoon after, inviting him to Florence, gave him the title of his firſt philoſopher and mathematician. In 1612, having obſerved the ſpots in the ſun, he printed an

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ry the VIIth of England, and in the year 1497 diſcovered Newfoundland, and ſailed along the coaſt of America, as far as the cape of Florida. And hence it appears, that whatever right the Spaniards may pretend to that part of the new world, the Engliſh have a right equal if not ſuperior to theirs; even ſetting aſide their claim to a diſcovery much earlier than that of Columbus himſelf, by a Welſh prince named Madoc, whoſe ſhip was accidentally caſt upon the American coaſt in the twelfth century; which ſtory, though treated by many as fabulous, ſeems not to be without foundation.

account of that diſcovery in the following year at Rome; in which, and in ſome other pieces, he ventured to aſſert the truth of the Copernican ſyſtem, and brought ſeveral new arguments to confirm it. Upon this he was cited to appear before the inquiſition at Rome, in 1615, where he was charged with hereſy, for maintaining that the ſun was the centre of our ſyſtem, and that the earth turns round on its own axis by a diurnal motion; both which propoſitions were declared contrary to the word of God; and having been detained by the inquiſition at Rome for upwards of a year, Cardinal Bellarmine made him promiſe not to defend this ſyſtem, either by word or writing; but Galilio did not keep his word; he went on making new diſcoveries in the Heavens, and fixteen years after, publiſhed his dialogue on the ſyſtems of Ptolemy and Copernicus, in which he undertook to prove, that the ſun was really immoveable; and that the earth turned round it. This work having made much noiſe, Galilio was again cited before the inquiſition at Rome, where in 1633, he was obliged, by a decree, to abjure his ſyſtem, as erroneous and heretical; and was condemned to remain in priſon, as long as the Cardinal Inquiſitors ſhould think fit, and his printed books were burnt at Rome. They, however, ſome time after, were contented with ſending him into the dominions of the duke of Tuſcany, where he was confined to the little town of Arcetri, with its territory. He was the author of ſeveral noble inventions and diſcoveries, beſides thoſe already mentioned, particularly in aſtronomy, he diſcovered the trepidation or vibration of the moon; as alſo the inequalities or mountains on its ſurface. By the frequent eclipſes of Jupiter's ſatellites, which he called the Medicean ſtars, he had thoughts of finding out the longitude, and compoſed his tables with their motions. In geometry he invented the Sycloid or Trochoid, and in mechanics, he firſt found out the exact degree of celerity in the deſcent of bodies, by the force of gravitation. He had likewiſe a taſte for architecture and painting, and played well on muſical inſtruments. He loſt his ſight two years before his death, which happened at Florence in 1642, when he was ſeventy-eight years of age. Many of his works have been unhappily loſt, by the folly of his wife, who was perſuaded by her Confeſſor to deliver them to him, in order to be burnt.

It is now time to paſs the Alps, (though we could not eaſily leave Italy ſooner) and take a view of what is moſt curious in the empire of Germany, in which we ſhall include Hungary, and other dominions belonging to the houſe of Auſtria, as alſo Switzerland, which laſt country would ſcarce furniſh matter enough for a ſeparate chapter.

CHAP. V.

Of GERMANY and SWITZERLAND.

SPRINGS, CATARACTS, LAKES, and CAVERNS.

WE are now entering into countries which abound with mineral waters of various qualities; but of all the ſprings of this kind none ſeem to have gained a greater reputation than thoſe of Spa or Spaw in the biſhoprick of Liege, which are not only reſorted to by people from moſt parts of Europe, but great quantities of the water, ſealed up in bottles, are ſent into other countries, eſpecially Holland and England. There are five ſprings in the town and its neighbourhood which are more frequented than the reſt, but the waters of the Pouhon ſpring in the market-place are moſt eſteemed, being preferred by our greateſt phyſicians to all the mineral waters in or near the biſhoprick. They promote digeſtion, remove obſtructions, ſtrengthen the tone of the viſcera, and are efficacious in ſeveral chronical diſeaſes. The Capuchins have a fine monaſtery at Spaw, and large gardens, where the company walk that drink the waters, the ſeaſon for which are the months of June, July, and Auguſt.

THE celebrated ſprings of Pyrmont are much of the ſame nature with thoſe of Spaw, and are even preferable in many caſes; but neither theſe nor any other mineral waters ſhould be indiſcreetly uſed without conſulting a phyſician. At the proper ſeaſon there is a great reſort of the nobility of Germany, as well as others, to drink the Pyrmont waters, which are alſo exported abroad in large quantities from Bremen, to which place they are carried by the river Weſer*.

AS the waters of Spaw and Pyrmont are in the greateſt repute for drinking, ſo thoſe of Aix-la-Chapelle (or Aken) are perhaps the moſt noted for bathing of any in Germany, being much frequented by the Engliſh and other nations. The principal baths in the old town are the Emperor's, the Little Bath, and that of St. Quirinus, in the firſt of which the emperor Charlemagne took delight to bathe with his ſons and nobles, being then all in one, whereas it is now divided into ſeveral apartments. The ſprings that fills theſe baths riſe ſo hot, that they let them cool ten or twelve hours before they are uſed. They are impregnated with nitre and ſulphur, are at firſt unpleaſant to the taſte, and of a diſagreeable ſmell. Thoſe in the new town, which are the Roſe Bath, the Poor's Bath, and St. Corneille's, are not ſo hot and clear as the former, but with reſpect to their ſmell and taſte there is not much difference. Near the hot ſprings lie ſeveral cold ones, and there is one moderately warm, much reſorted to in ſummer mornings, and drank for chronical diſeaſes.—Dr. Blondel, who in a printed diſcourſe has made a compariſon between the waters of Bath in England and thoſe of Aix-la-Chapelle, ſays that bathing in the latter is good againſt convulſions, palſies, numbneſs, tremblings, gout, ſciatica, the diſeaſes peculiar to women, nephritic diſorders, and to carry off the dregs of bad mercury made uſe of in venereal caſes. Tho' they are propereſt for bathing, they are alſo drank in ſeveral diſtempers with ſucceſs, particularly in obſtructions of the liver, ſpleen, and reins, and in the ſcurvy, jaundice, and dropſy. They are excellent againſt ſtubborn fevers, agues, inveterate cholicks, aſthmas, and cutaneous diſeaſes; they purge the urinary veſſels, diſcharge gravel, relieve melancholy, and are ſerviceable in various other caſes, not neceſſary to be here enumerated.——In a village juſt out of the town are many other hot baths, the water of which is clear and pleaſant, without any diſagreeable ſmell; and here people of all ages and conditions bathe freely, not only for health, but for diverſion. The ſprings of this village and thoſe of the city are ſo plentiful, that it is computed they yield every day ſix thouſand tuns of water. The firſt ſeaſon for theſe baths begins in May, the ſecond in Auguſt.

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* It appears from the Philoſophical Tranſactions, No. 448, that in calm dry weather, and a clear ſky, there ariſes from the Pyrmont ſprings a ſulphureous ſteam, which ſuffocates birds that approach it; and ducks, that ſwim in a large ſpring commonly uſed for bathing, can ſcarce hold out a few moments in this ſteam, but die away immediately.

THE town of Baden in Switzerland has been long famous for its hot baths, and to them it chiefly owes its flouriſhing condition. They are about half a mile below the town, and are ſupplied from ſeven ſprings by the ſide of the river Limmat, whoſe waters contain a great deal of ſulphur, with a mixture of alum and nitre. They are uſed for drinking as well as bathing, and are recommended for the cure of fevers, aſthmas, pains in the head, diſorders in the breaſt and bowels, and particularly for the diſeaſes to which women are ſubject.

THE hot baths of Baden in Swabia, whoſe waters proceed from rocks of ſalt, alum, and brimſtone, are reckoned an infallible remedy for the cramp, gout, and other nervous diſtempers, on which account they are much frequented. Some of them are very hot, particularly one called the Kettle, the water whereof boils and ſmoaks as if it were over a furnace.—There is another town of the ſame name in Auſtria, whoſe hot waters are reſorted to ſeveral months in the year for bathing; and the German phyſicians recommend them, if drank in time, for the gout, dropſy, and other chronical diſeaſes *.

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* Chronical is a term applied by phyſicians to a ſlow diſeaſe, which laſts a long time, as an aſthma, dropſy, &c.

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We might mention a great many other towns in the countries we are treating of, that are remarkable for their medicinal waters, but one more ſhall ſuffice, namely, Buda in Hungary. The baths of this city (according to Dr. Brown) are the fineſt in Europe for plentiful ſprings and magnificent buildings. Some of the waters are fit either for bathing or drinking, but ſeveral are ſo hot, that they cannot be uſed without conveying them to cool in other baths, or mixing them with cold water. They have a ſulphureous ſmell, and are of a petrefying quality. Here is a cold bath ſo near to a hot one, that a man may at the ſame time put one hand into each.—It is ſaid here are fiſh in ſome baſons or ponds of hot water, which being thrown in the neighbouring Danube, or other cold water, die immediately.

In the Philoſophical Tranſactions we have an account of a ſtrange ſpring near Paderborn in Weſtphalia, which loſes itſelf twice in twenty-four hours, but returns with a great noiſe, and with ſuch force, that the ſtream turns three mills a little below; for which reaſon it is called the Bolder Born, or Boiſterous Spring.—There is alſo an account of another remarkable ſpring near the ſame city, which ſends forth three ſtreams at a little diſtance from each other; one of which is limpid, blueiſh, luke-warm, and impregnated with vitriol, alum, ſulphur, and other minerals; the ſecond with much the ſame taſte, but turbid, whitiſh, and cold as ice; and the third taſting both ſour and ſweet but very clear, and of a greeniſh colour.

In oppoſition to which, thoſe which are ſpeedy, and haſten to a criſis, ſuch as fevers, ſmall-pox, &c. are called acute diſeaſes.

THE Danube, the moſt conſiderable river in Europe, takes its riſe in the Black Foreſt in Germany, from whence, to its fall into the Black Sea, it performs a courſe of above 1500 miles at a moderate computation, without including its windings and turnings. It has ſeveral remarkable cataracts, which is the name we give to thoſe places in a river where the water falls down a rock or precipice with great noiſe and impetuoſity. The moſt remarkable of theſe cataracts are the Saw Ruſſel, or Swines Snout, near Lintz, ſo called from a prominent rock which has under it a dangerous whirlpool; and another called Der Strudel, where the falling of the water makes a dreadful noiſe.

THE Rhine, another noble river, has alſo its navigation interrupted by ſeveral cataracts, the moſt dangerous whereof are two in Switzerland; the one near Schaffhauſen, where the whole river falls ſeventy or eighty foot; the other at Lauffen, about a league below, where the water is precipitated down the rocks with ſuch a prodigious violence, that the noiſe may be heard, in a calm night, at the diſtance of twelve or fifteen miles. Here the goods put on ſhore at Schaffhauſen, and brought hither by land, are taken in by other veſſels to proceed down the river.

BUT after all that we have ſaid concerning the ſprings and rivers of Germany, perhaps none of the natural curioſities of that country is more ſurprizing than the Zirchnitzer ſea or lake in Carniola, ſo called from the neighbouring town of Zirchnitz.—This lake is four or five miles in length, and about two in breadth*, ſurrounded at ſome diſtance with woody mountains which are full of deer, wild boars, hares, and other game. It is commonly ſaid, that in this lake a perſon may ſow and reap, hunt and fiſh, within the ſpace of a year; but this is the leaſt remarkable circumſtance in it, and no more than what may be ſaid of almoſt any other ſpot that is overflowed in winter or ſpring. The moſt wonderful circumſtance is its ebbing and flowing. The former always happens in a long drought, when it runs off through eighteen holes at the bottom, which form ſo many eddies or whirlpools. Valvaſor mentions a ſingular method of fiſhing in one of theſe holes, and ſays, that when the water is entirely run off into its ſubterraneous reſervoirs, the peaſants venture with lights into that cavity, which is in a hard rock, three or four fathoms under ground, to a ſolid bottom; whence the water running through ſmall holes, as through a ſieve, the fiſhes are left behind, caught, as it were, in a net provided by nature.

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* This is agreeable to M. Valvaſor's account in the Philoſophical Tranſactions, but Dr. Brown gives the lake almoſt double

On the firſt appearance of its ebbing a bell is rung at Cirknitz, upon which all the peaſants in the neighbouring villages, with the utmoſt diligence, prepare for fiſhing; for the greateſt part of the fiſh generally go off at the beginning of the ebb, and ſeldom ſtay till the water is conſiderably decreaſed. Above a hundred peaſants never fail to exert themſelves on this occaſion, and both men and women promiſcuouſly run into the lake ſtripped quite naked, though both the magiſtrates and clergy have uſed their utmoſt endeavours to

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double theſe dimenſions: there is alſo ſome little difference between theſe gentlemen with reſpect to the time of the waters ſinking and riſing again, which the Doctor fixes abſolutely to the months of June and September.

ſuppreſs this indecent cuſtom, particularly on account of the young lay-brothers of a neighbouring convent who have the privilege of fiſhing there; and notwithſtanding the prohibitions of the fathers, leave the convent to ſee this uncommon ſpectacle. The peaſants however, are not obſerved to be guilty of more lewdneſs at theſe times than at others, when they are cloathed. At theſe ebbings an incredible number of pikes, trout, tench, eels, carp, pearch, &c. are caught in the lake; and what are not conſumed, or diſpoſed of while freſh, are dried by the fire.

THOUGH the whole lake is left dry, except two or three pools, yet Mr. Keyſler ſays, immediately upon the return of the water, it abounds in fiſh as much as it did before; and the fiſhes that return with the water are of a very large ſize, particularly pikes weighing fifty or ſixty pounds. It is alſo remarkable that when it begins to rain hard, three of the cavities ſpout up water to the height of two or three fathoms, and if the rain continues, and is accompanied with violent thunder, the water bubbles out of all the holes through which it had been abſorbed, two of them excepted, and the whole lake is again filled with water in twenty four, and often in eighteen hours. Sometimes not only fiſh, but live ducks, with graſs and fiſh in their ſtomachs, have emerged out of theſe cavities.

IN a rock on one ſide of the lake, but conſiderably higher than its ſurface, are two caverns, at ſome diſtance from each other; and when it thunders the water guſhes out of both, with great noiſe and impetuoſity: if this happens in autumn, they alſo eject a great many ducks, which are blind, but very fat, and of a black colour; and though they are at firſt almoſt bare of feathers, in a forta fortnight's time, or at fartheſt before the end of October, they are entirely fledged, recover their ſight, and fly away. Each of theſe caverns is ſix feet high and as many broad; and when the water guſhes out of them, it is in a large column of the ſame dimenſions and in a continual ſtream. There is a large paſſage in each of theſe caves, where a man may walk upright for a conſiderable way; but it is ſaid that no perſon has ever yet ventured into them, to ſearch into the nature of the inner caves and reſervoir to which theſe apertures lead; for there is no certainty, but that in an inſtant he may be ſurprized by the water ruſhing upon him, with the force and rapidity of a fire engine. If the lake ebbs early in the year, within twenty days time graſs grows upon it, which is mowed down, and the bottom afterwards ſown with millet: but if the water does not run off early, nothing can be ſown; and if it ſoon returns, as it ſometimes does, the ſeed is loſt: otherwiſe after the millet harveſt all manner of game is hunted and ſhot in it.

M. Valvaſor accounts for the wonderful phænomena of this lake in the following manner: there is (he ſuppoſes) under the bottom of the lake another ſubterraneous one, with which it has a communication by the ſeveral holes above-mentioned. There is alſo a lake under a neighbouring mountain, called Javornick, whoſe ſurface is higher than that of the lake of Zirchnitz, and which is poſſibly fed by ſome rivulets that bury themſelves under ground, which are common in that country. When this upper lake is ſwelled by great or ſudden rains, it finds ſeveral caverns in the mountain higher than its uſual ſurface, through which it flows into the lake under that of Zirchnitz, from whence it riſes through the holes in the bottom of that lake; which water again falls away after a long drought, when the ſprings that feed the upper lake under Javornick are much decreaſed. That the waters of theſe lakes are carried off by ſubterraneous paſſages, and form a river on the other ſide of the mountain, M. Valvaſor has alſo made appear beyond diſpute.

We apprehend it will not be diſagreeable, if to this account of the lake of Zirchnitz we ſubjoin a few obſervations on the lake of Geneva, which in ſeveral reſpects is one of the moſt remarkable in Europe. This lake is ſhaped like a creſcent, one of whoſe extremities is eighteen leagues diſtant from the other, and in the broadeſt part it is about five leagues over. Its depth is very ſurprizing, being in ſome places, particularly before Rolle, not leſs than five hundred fathoms; and thereabouts, it is ſaid, a kind of iſland may be ſeen under water. The Rhone enters the lake at one of the points of the creſcent, and iſſues out at the other, but with this difference, that whereas it comes in muddy and turbid, it always goes out ſo pure and clear, that under the bridge of Geneva, where the water is twenty-five feet deep in ſummer, one may ſee the ſmalleſt ſtones at the bottom. This river, upon entering the lake, loſes its rapidity, but ſome ſenſible motion is here and there obſerved, by which its current is diſtinguiſhed; and ſoon after its coming out of the lake it reſumes its rapid courſe, which, as its bed becomes narrower, grows conſequently more impetuous *. The lake is always higher in ſummer

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* Notwithſtanding the rapidity of the Rhone, its courſe has been ſometimes ſtopped by a ſtrong weſterly wind, ſuch as happened in the winter of 1645, which not only uncovered

mer than in winter by twelve or fifteen feet, commonly beginning to increaſe about the end of January, and continuing to do ſo till July or Auguſt; which is generally attributed to the melting of the ſnow and ice from the neighbouring mountains, though probably there is a concurrence of other cauſes. In calm weather, and even before ſun-riſing, the lake ſometimes appears as if it conſiſted of ſeveral pieces differently coloured, which is thought to proceed from the different images of the adjacent mountains blended together in the water; and there is one part browner than the reſt, which is owing to a gentle agitation of the water, cauſed either by a breath of wind paſſing through it, or (as ſome think) by ſprings at the bottom, imparting a tremulous motion to the ſurface. The lake is plentifully ſtored with fiſh, and it is obſervable, that the different ſpecies ſeem to have cantoned themſelves as it were, and to have divided it amongſt them; trouts being only found in the current of the Rhone, carp near Vevay, &c but ſome fiſhes that are only paſſengers, and not inhabitants of the lake, ſpread themſelves all over it indifferently. The trouts taken here are very large, ſome of them weighing fifty

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ed the houſes at Geneva, but laid bare the channel of the river above the bridge, ſo that people paſſed over dry ſhod for the ſpace of an hour, after which it reſumed its former courſe. Gallaſius in his commentary on Exodus, printed 1560, relates, that the ſame accident happened at Geneva when he was miniſter there, a ſouth weſt wind making the Rhone recoil into the lake, and affording a dry paſſage for an hour together. Another cauſe has alſo ſometimes interrupted the courſe of this river; for in December 1652, the Arva, which falls into the Rhone a little below Geneva, ſwelled to ſuch a degree, that it not only overflowed its banks, but forced the Rhone back into the lake for the ſpace of fourteen hours.

pounds; and ſometimes they catch pikes of eighty pounds weight, and the pound at Geneva is eighteen ounces.

ABOUT half way up a high rocky mountain near Adlerſberg in Carniola, is the entrance into a large cavern that is divided into a great number of ſubterraneous paſſages. The eye is here delighted with viewing a multitude of ſparry iſicles formed on the arched roof of this vaſt cavern, by the exudations of a lapideous or petrifying fluid, which forms the moſt beautiful decorations. The ſides are covered with all kinds of figures produced by the ſame exudations, to which the imagination of the ſpectator gives various forms never intended by nature; ſo that it is not at all ſtrange that ſome people ſhould make out dragons, heads of horſes, tygers, and other animals. Several pillars, which are to be ſeen on each ſide, proceed from the droppings of the petrifying fluid from the top, which form a kind of ſparry pillars on the bottom of the cave; this gradually increaſes, till at laſt they join the iſicles at the top, by meeting it about half way, and thus a complete pillar is formed. If any one's curioſity ſhould carry him ſo far, he may rove about two German miles in the ſubterraneous paſſages of this cavern.

AT the diſtance of about two German miles from Adleſberg, is a ſtill more remarkable cavern, named St. Magdalen's cave. The way to it is extremely troubleſome, from its being covered with ſtones and buſhes; but the fatigue in going to it is much over-paid by the ſplendor of the ſight. You firſt deſcend into a kind of hole before you reach the entrance, which reſembles a fiſſure in a huge rock cauſed by an earthquake. Here the torches are always lighted to conduct travellers, the cave being extremely dark. This wonderful cavern ſeems as if divided into ſeveral large halls and other apartments. The vaſt number of pillars by which it is ornamented by nature, give it a ſuperb appearance; for they are as white as ſnow, and have a kind of tranſparent luſtre reſembling white ſugar candy. The bottom is of the ſame materials, ſo that a perſon may imagine he is walking among the ruins of ſome ſtately palace, amidſt noble pillars and columns, partly mutilated, and partly entire. Sparry iſicles are ſeen every where ſuſpended from the top, in ſome places reſembling wax tapers, which appear extremely beautiful for their radiant whiteneſs. But the inequality of the bottom makes the ſpectator liable to ſtumble, while he is viewing the beauties around and above him.

MINERALS and FOSSILS.

GERMANY, and the other countries we are ſpeaking of, abound with metals and minerals of various kinds; and ſome of their mines are ſo remarkable as to deſerve particular notice. Amongſt theſe may be reckoned the Salt-Mines near Eperies or Eper in Upper Hungary, which are 180 fathoms deep, and the ſalt runs in ſuch large veins, that they ſometimes dig pieces not leſs than ten thouſand weight; but theſe are uſually cut into ſquare pieces, two feet long and one foot thick, for the convenience of drawing them out of the mine. The colour of the ordinary ſtone is ſomewhat grey, but when it is broke and ground for uſe it becomes as white as if it was refined. Some of the ſalt is of a delicate blue, ſome yellow, and ſome as hard and tranſparent as cryſtal, which is wrought into various little toys and utenſils. The water of this mine, when boiled, yields a blackiſh ſalt, which they give to their cattle.—A curious naturaliſt cannot help admiring in thoſe pits the Flowers of Salt, which grow like the beard of a goat, but much whiter and finer; but they are not to be found in all the cuts, nor at all times, only appearing according to the temperature of the ſeaſon. Theſe plumes of ſalt are very brittle, will melt in moiſt places, and diſſolve into a volatile oil: but they are the pureſt, whiteſt, moſt acid and beautiful ſalt that can be imagined. Another thing remarkable in this mine is a chapel, big enough to contain a hundred people, with an altar, pulpit, ſacriſty, and ſeats, all cut out of a rock of ſalt. In this chapel divine ſervice is celebrated once a year, a Jeſuit of Eper always preaching the ſermon.

NEAR Hallein, in the archbiſhoprick of Saltzburg, there is a high mountain, the earth whereof is mixed with a ſort of alum or ſalt-petre, which being laid for three or four weeks in large trenches filled with freſh water, the earthy part ſubſides, and the water is then drawn off and boiled in huge iron pans, till it is quite evaporated and leaves the ſalt at the bottom. This mountain is pierced in a thouſand places, ſo that very good guides are neceſſary to conduct ſtrangers who have the curioſity to viſit the ſubterraneous labyrinth, which is ſeldom done without a great deal of ceremony. Before they enter theſe works, they generally repair to a church upon the mountain to perform their devotions, after which they breakfaſt at a publick houſe near the church, and being furniſhed with proper dreſſes and other neceſſaries, every one takes a lighted candle or torch in his hand, and ſome of the guides go before and others behind the ſpectators, leſt they ſhould be frightened or loſe their way in the diſmal caverns. After they have viewed every thing remarkable, which takes up ſeveral hours, they go to Hallein to dine and be merry.

BETWEEN Saltſburg and Uncken, which are about ſixteen Engliſh miles diſtant, are the Bavarian ſalt-works, at Reichenhall, where the ſalt ſpring is called God's Goodneſs. The water is raiſed by two wheels, one of them thirty-ſix feet in diameter. On the edges of theſe wheels are faſtened ſmall leathern buckets that throw the water up to a high workhouſe; whence half of it is conveyed three German miles in leaden pipes over high mountains, as far as Traunſtein, where, though it is at ſuch a diſtance from the ſpring, more ſalt is made than at Reichenhall. Near this ſalt ſpring is a ſtream of freſh water, by the ſwift current of which, the wheels and water engines are worked. As theſe ſprings are encompaſſed with hills, and the place, by lying in a valley, in danger of being overflowed, an aqueduct was made at a prodigious expence, about three hundred years ago. This channel is, indeed, an amazing work, it running half a league in length under the town of Reichenhall, and ſeveral gardens and fields, twelve fathoms below the ſurface. What perhaps is moſt aſtoniſhing is, that this ſubterraneous channel is navigated, and people paſs through it in a boat by the help of candles, with ſuch rapidity, that they get into open day light in a quarter of an hour. The water is generally between three and four feet deep; but is often ſo ſwelled by the rains, as not to leave room for the boat with the paſſengers ſitting upright. The canal is five feet broad, and every eight or ten years the bottom is cleared of the ſtones carried thither by the floods, or wantonly thrown down the ſpiracles or openings, which are raiſed up in the form of towers, open on the top to admit the freſh air, and thro' ſome of which you may ſpeak with the people on the city walls. The roof, which appears as if it would laſt for ever, is not only formed of free-ſtone, but in many places covered with a very hard kind of rozin, as with a varniſh, ſo that it looks as if it were one entire ſolid piece. The deſcent to this ſubterraneous canal, is by the ſteps of a tower near the ſpring.

BUT we ſhall leave theſe mountains of ſalt to take a view of thoſe which contain treaſures of the moſt valuable kind, namely, gold and ſilver, conſiderable quantities whereof are found in divers parts of Germany, and particularly in the mines of Hungary. Of theſe the richeſt in gold is that of Chremnitz, which is about 160 fathoms deep, is ſeveral Engliſh miles in length, and has been wrought above 900 years. The veins generally run north or eaſt, and the miners direct themſelves under ground by a compaſs. Some of the paſſages in this mine, cut long ago through the rocks, by being diſuſed are quite cloſed up again, and others are become very narrow, the rocks growing and uniting by degrees, eſpecially in moiſt places. Pieces of pure gold, of a conſiderable ſize, have been ſometimes found in this mine; but the gold is generally bedded in a ſort of ſtony glebe or ore of ſeveral colours, ſome white, ſome black, red, or yellow, ſome white with black ſpots in it, which is eſteemed the beſt: nay, the common yellow earth of the country about Chremnitz affords ſome gold, and has been waſhed and wrought with conſiderable profit.—They have various methods of ſeparating the gold from the ore, but the moſt uſual one is this. After the ore is broke and pounded very ſmall, they lay it upon fine cloths, waſhing and ſtirring it about till the earthy and lighter parts are waſhed away, and the heavier metalline parts are left behind. Theſe cloths are afterwards waſhed clean in ſeveral tubs, and the water, when ſettled, is poured off from its ſediment; which ſediment is again waſhed and ſtirred about, till at length they add quickſilver to it kneading it well together, and then waſhing it again in a wooden veſſel. The gold and quickſilver being thus mixed together, they ſtrain off as much of the quickſilver as they can, firſt through coarſe, and then through fine cloaths, and the remaining maſs is laid upon a perforated plate, ſet over a deep pan fixed in the ground, in the bottom of which they alſo put ſome quickſilver. This pan is covered over, and the cover well luted; and a charcoal fire being made upon it, the quickſilver yet remaining in the gold is driven down to that in the bottom of the pan. The gold is then taken out and thrown into the fire, where it undergoes a farther purification.

Of the ſilver-mines in Hungary, thoſe at Schemnitz are the moſt noted. They are ſix in number, one of which called Trinity mine is ſeventy fathoms deep, and being of an earthy ſoil its ore is much eſteemed. In another of theſe mines is a large wheel, twelve yards in diameter, which is turned by the fall of ſubterraneous waters, and works engines that raiſe the water from the bottom of the mines up to the place where the wheel is fixed; which water, together with that which turns the wheel, runs out at the foot of a hill through an opening cut for that purpoſe. The ore that is of a blackiſh colour is reckoned the beſt, and much of it is mixed with a ſhining yellow ſubſtance, which, if not in two great quantity,

tity, renders the ore more eaſily fuſible; but as the ore found in theſe mines differs in its mixture, ſo alſo does it in its richneſs, ſome of it yielding half ſilver (though this is very rare) ſome of it twenty ounces, and ſome of it not above an ounce in a hundred weight. To ſeparate the ſilver the ore is melted in a furnace, from whence the metal runs into a pan placed in the earth before it, and there acquires a hard ſcum or droſs, which they take off, and add lead to the remaining ſilver. This being again melted in another furnace, the lead, and what other mixture may yet remain in the ſilver, ſwims on the top like oil, is blown off by bellows, and becomes litharge, which is of a paler or deeper colour according to the time it continues in the fire, or the degree of heat it undergoes*.

In the neighbourhood of Friedberg in Saxony there are mines of ſeveral ſorts of metal, and particularly ſome of ſilver, which yield ſuch quantities, that the elector's profit ariſing from them is ſaid to amount to 130,000 pounds per annum. The chief of theſe mines is above 200 fathoms deep, and was formerly ſo rich, that an hundred weight of ore produced ſixty pounds of ſilver, but commonly a pound of ore yields an ounce and a half or thereabouts. It is computed, that ſince the firſt opening of this mine, about the end of the twelfth century, it has yielded above a hundred millions of ſilver. Theſe mines are ſubject to damps, which ſometimes kill the workmen; and the duſt, which ſettles on their lungs, frequently throws them into conſumptions; but they wear vizards with glaſs eyes, to prevent its annoying them as much as poſſible.—We are told that in Saxony, as well as in ſome other places, they diſcover the veins of ore, and know where to ſink a mine, by virtue of a ſort of wand called Virgula divina *.

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* Litharge is diſtinguiſhed into two kinds, viz. Litharge of Gold, and Litharge of Silver, according as it reſembles thoſe metals in colour: not that the one is made from ſilver, and the other from gold; but the difference ariſes only from its having been more or leſs expoſed to the fire, or containing a greater or leſs mixture of copper. It is of a drying, detergent, and gently-aſtringent quality, and is frequently uſed in external applications, making the baſis of ſeveral plaiſters. Potters uſe litharges to give a beautiful gloſs to their ware; and they are alſo uſed by painters, dyers, ſkinners, and glaziers. When mixed with wine they give it a ſprightly colour, but render it very unwholeſome.

BESIDES theſe precious metals, the mines of Germany and Hungary afford many other curious and uſeful foſſils. In thoſe of Saxony we have juſt been ſpeaking of, there is found a kind of Sulphur Ore or Pyrites, which being broken into ſmall pieces, and thrown into earthen veſſels placed in proper furnaces, the ſulphur contained in the ore is melted by the fire, and runs out through a narrow hole into leaden veſſels filled with water,

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* The Virgula divina, or Baculus divinatorius, is nothing but a forked branch of a hazle-tree, by means whereof ſome people pretend to diſcover mines, ſprings, &c. under ground. The perſon carries it in his hand, walking over the places where he ſuſpects the ore or ſprings to lie, and it is ſaid that the effluvia exhaling from the metals, or vapour from the water, will cauſe the ſtick to incline or point to the ground, which is reckoned an infallible ſign of a diſcovery. We find no mention of this Virgula in any author before the eleventh century, but ſince that time it has been in frequent uſe, and has obtained ſeveral fine names, ſome calling it Caduceus, others Aaron's Rod, &c. This artifice made a great noiſe in France towards the end of the laſt century, and its advocates endeavoured to account for it on the principles of the corpuſcular philoſophy; but it is now in little credit.

where it concretes immediately, and the ſubſtance which remains behind contains a conſiderable quantity of vitriol. The ſulphur is purified by melting it a ſecond time in iron veſſels, and boiling it with the addition of ſome linſeed oil; after which it is either made up in large lumps, or poured into cylindrical moulds, and ſo formed into rolls. Thus prepared it is called Brimſtone, and vaſt quantities of this kind of ſulphur are yearly made in Saxony, and tranſported into all parts of Europe.—Sulphur Vivum, or Native Sulphur, is likewiſe found in the mines of Germany, Switzerland, and Hungary, ſometimes in tranſparent pieces of a beautiful yellow colour; but the coarſe, opake, greyiſh kind is moſt common, being uſually found in flat maſſes of various ſizes, and ſometimes in whole ſtrata of a conſiderable thickneſs. Sulphur is alſo found in the form of a fine yellow powder, adhering to the ſtones and wood about the baths of Aix-la-Chapelle, thoſe of Buda in Hungary, and other ſulphureous ſprings; in which ſtate it very much reſembles the common flower of brimſtone *.

NATIVE Vitriol is a kind of foſſil ſalt not uncommon in the German and Hungarian mines; and particularly in thoſe of Goſlar in Saxony, there is a fine green vitriol, very bright and tranſparent, found in the clefts of the rocks in great abun-

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* Sulphur in this form, and indeed in moſt others, is of excellent ſervice in diſeaſes of the lungs, of which it is, by way of eminence, called the Balſam; becauſe it promotes expectoration, and clears and ſtrengthens that organ. It is therefore very beneficial in phthiſics, aſthmas, or catarrhs; and it has ever been a famous medicine in cutaneous diſeaſes, whether uſed inwardly or outwardly. Externally applied it diſcuſſes hard tumours; and taken inwardly it is laxative, and promotes inſenſible perſpiration.

abundance. In theſe mines there is alſo a white vitriol, ſometimes found in pieces of a compact ſubſtance, but moſt commonly in form of a downy efflorefcence on the tops and ſides of the caverns, which being diſſolved in water, is afterwards boiled till it concretes into a white maſs like ſugar, and is then formed into thoſe large cakes in which we receive it from abroad. There is another vitriol of a blueiſh green which is ſometimes found in the mines of Saxony, but more frequently in thoſe of Hungary and Tranſylvania; and Dr. Brown mentions a red vitriol in the gold mines of Chremnitz, which perhaps is the Chalcitis of the ancients. Theſe vitriols owe their origin to iron or copper, diſſolved by the acid of ſulphur and water, and again concreted into the forms wherein they are found. The green colour is derived from iron, the blue from copper, and the white and red proceed from a mixture of ſome other ſubſtances.——As to factitious vitriols, they are obtained by various methods from vitriolic waters, earths, and ſtones, and eſpecially from the pyrites. At Friedberg in Saxony, they burn the ſtony ore from which the ſulphur has been ſeparated, (as mentioned above) and putting it into a large veſſel, they pour water upon it, which imbibes the vitriol it contains, and being afterwards boiled to a certain conſiſtence is let out into coolers, where the pureſt part of the vitriol adheres to ſticks placed there on purpoſe, and the reſt to the ſides and bottom. In the neighbourhood of the copper-mines in Hungary, and ſometimes in the mines themſelves, there are found ſmall ſtreams of clear vitriolic water *, in which, if a piece of iron

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* In the Philoſophical Tranſactions, No. 384, we have an account of the body of a man found under water in a copper-mine

iron be put and immediately taken out again, it is found covered with a thin cruſt of copper; and if the iron remain long in the water, it is gradually diſſolved, and the copper precipitated and left in its place. This water being boiled to a proper conſiſtence, and ſet to cryſtallize, yields a beautiful blue vitriol, ſhooting into regular figures conſiſting of ten ſides, in which form we find it in the ſhops. Theſe cryſtals, if wetted and rubbed on the blade of a knife, give it the colour of copper, that metal being the baſis of this vitriol *.

WE ſhould greatly exceed our limits, were we to attempt a deſcription of all the foſſils found in the mines of Germany, Hungary, and Tranſilvania, ſuch as antimony, biſmuth, orpiment, and

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mine eighty-two fathoms deep, where he had been killed by the falling in of a rock, which had cruſhed both his legs and his right arm, but his face, his body, and his cloaths were all preſerved entire and free from putrefaction, by means of the vitriol with which the water was impregnated. He was taken up in the year 1719, and was well known by an old miner, who remembered his going down by himſelf into the mine in 1670, after which the man was miſſing and ſuppoſed to be ſmothered in the ruins. This account was confirmed by ſeveral others, and particularly by an old woman, to whom he had been contracted. He had therefore lain under ground forty-nine years; and not only his cloaths and linen, but his fleſh and ſkin, which were almoſt as hard as horn, had been preſerved from corruption by the vitriolic water.

* The uſes of vitriol are very great, both in medicine and mechanics. The white ſort is frequently uſed in collyriums, to allay an inflammation of the eyes, and ſtop their running; and, when properly purified, it is a gentle and ſafe emetic. The powder of the blueiſh green is an excellent ſtyptic, as the miners know by experience, who always apply it to their wounds to ſtop the bleeding. Vitriol is much uſed by dyers and hatters, eſpecially the factitious green which we call Copperas; and this is alſo a principal ingredient in writing-ink, though the white is greatly preferable for that purpoſe.

a great variety of others. Hungary has mines of quickſilver, but thoſe near Idra in Carniola, are perhaps the richeſt of their kind in Europe. Theſe were firſt diſcovered in the year 1497. Before that time, ſays Mr. Keyſler, this part of the country was only inhabited by a few coopers, and other artificers in wood, with which this country abounds. But one evening a cooper having placed a new tub under a dropping ſpring, in order to try if it would hold water, when he came in the morning to take the tub away, found it ſo heavy, that he could hardy move it. At firſt the ſuperſtitious notions, that are apt to poſſeſs the minds of the ignorant, made him begin to ſuſpect that his tub was bewitched; but at laſt perceiving a ſhining fluid at the bottom, and not knowing what to make of it, he went to Laubatch, where he ſhewed it to an apothecary, who, being an artful man, diſmiſſed him with a ſmall gratuity, and bid him bring him ſome more of the ſame ſtuff, whenever he could meet with it. This the poor cooper frequently did, being highly pleaſed with his good luck, till the affair being at laſt made public, ſeveral perſons formed themſelves into a ſociety, in order to ſearch farther into the quickſilver mine. In their poſſeſſion it continued, till Charles duke of Auſtria perceiving the great importance of ſuch a work, gave them a ſum of money, as a compenſation for the expences they had been at, and took it into his own hands.

We are told, that the ſubterraneous paſſages of the mine are ſo extenſive, that it would take up ſeveral hours to go through them. The greateſt perpendicular height, computing from the entrance of the ſhaft, is eight hundred and forty feet; but as they advance horizontally under a high mountain, the depth would be much greater, if it was meaſured from the ſurface of the hill. One way of deſcending down the ſhafts is by a bucket; but as the entrance is narrow, the bucket is liable to ſtrike againſt the ſides, or to be ſtopped by ſomething in the way, ſo that it may be eaſily overſet. The other way of going down is ſafer; this is deſcending by a great number of ladders, placed obliquely in a kind of zig-zag; but as the ladders are wet and narrow, a perſon muſt be very cautious how he ſteps to prevent his falling. As you deſcend there are reſting places in ſome parts, that are very welcome to the weary traveller. In ſome of the ſubterranean paſſages the heat is ſo intenſe, as to throw a man into a perfect ſweat; and formerly, in ſome of the ſhafts, the air was extremely confined, ſo that ſeveral miners have been ſuffocated by a kind of igneous vapour called the Damp; but by ſinking the main ſhaft deeper, this has been prevented. Near the main ſhaft is a large wheel, and an hydraulic machine, by which all the water is raiſed out of the bottom of the mine.

THAT called Virgin Mercury is prepared by nature, and is found in ſome of the ores of this mine, in a multitude of little drops of pure quickſilver. This is alſo to be met with in a kind of clay, and ſometimes flows down the paſſage, or fiſſures of the mine in a ſmall continued ſtream, ſo that a man has frequently gathered in ſix hours thirty-ſix pounds of Virgin mercury, which bears a higher price than common quickſilver. The reſt is extracted from cinnabar, which is the ore of quickſilver. This is pounded, waſhed, and diſtilled in large iron retorts, from whence the mercury comes over pure into the receiver. Eight hundred retorts are employed at a time in the furnaces belonging to this mine; and we may judge of the vaſt quantities of quickſilver procured from them by what doctor Brown tells us, that when he was there, he ſaw in the caſtle above four hundred and ſeventy tons of it in barrels, and in another place, as much ore as would take up two years to diſtil.

MANY of the miners are afflicted with a nervous diſorder, accompanied with violent tremblings, ſudden convulſive motions of the hands and legs, and frightful diſtortions of the face. Thoſe are moſt ſubject to theſe diſorders who work in the places where virgin mercury is found, which in a ſurprizing manner inſinuates itſelf into their bodies; ſo that when they go into a warm bath, or are put into a profuſe ſweat by ſteam, drops of pure mercury have been known to iſſue through the pores from all parts of the body. Theſe mines are often infeſted with rats and mice, which feed on the crumbs of bread, &c. dropped by the miners at their meals. But this plague ſeldom laſts long; for even they are ſeized with the like convulſive diſorders as the men, which ſoon kills them. It is eſteemed a neceſſary precaution for every perſon to eat before he deſcends into theſe ſubterraneous regions *.

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* Quickſilver, which was reckoned poiſonous by the ancients, is now found to be a moſt excellent medicine when judiciouſly adminiſtered, and has been of late years uſed with great ſucceſs in many diſtempers, which before were eſteemed extremely obſtinate, if not incurable. It opens the pores, ſmall veſſels, and ducts of the glands, attenuates viſcid humours, and diſſipates concretions, even in the remoteſt parts of the body. Whether taken inwardly, or applied outwardly by unction, it diſcharges the humours by ſtool, ſweat, and inſenſible perſpiration; but its uſual method of operating is by the evacuation of a mucous Saliva, whence it is called a Salivation. This is thought the moſt effectual remedy yet diſcovered

THE mines of Bohemia and Sileſia yield conſiderable quantities of gold and ſilver, as well as of the baſer metals; but having ſaid ſo much concerning the mines of Hungary and Saxony, we need not enlarge on this part of our ſubject. However, we ought not to conclude this article without obſerving, that Bohemia and Sileſia abound more with agates, garnets, ſapphires, amethyſts, and other precious ſtones, than any part of Germany, or indeed of Europe. Of the agate and garnet we have already taken ſome notice in the chapter which treats of Spain and Portugal; the other gems here mentioned require a brief deſcription.

THE Sapphire, which ſome call the gem of gems, is a very beautiful ſtone, of a deep ſky-blue, approaching neareſt to the diamond in luſtre, tranſparency and hardneſs. This is the fineſt and moſt valuable kind of ſapphire, but thoſe of

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vered for the venereal diſeaſe; tho' ſeveral eminent phyſicians condemn the practice of ſalivating as contributing nothing to the cure, the full effect of the medicine being to be had without putting the patient to that unneceſſary torture.—Quickſilver is of conſiderable uſe in gilding, making looking-glaſſes, refining gold, &c. but its effluvia are very pernicious, as the workmen employed about it know by experience: and it is obſerved, that the miners, though of the ſtrongeſt conſtitutions imaginable, ſeldom remain four years in a healthy ſtate, but are ſeized with tremblings and palſies, and die in a miſerable manner. Indeed the ſubtilty and penetrating nature of this mineral is very ſurprizing; for Dr. Pope tells us, that he ſaw a workman in the mines of Friuli, who in half a year's time was ſo impregnated with the mercury, that putting a piece of braſs in his mouth, or rubbing it between his fingers, it would turn white as ſilver. We may add, that by an injudicious uſe of quickſilver, whether outwardly or inwardly, the nerves are weakened, corrupted, and contracted; whence tremors, palſies, and too great an attenuation of the fluids, which often brings on a fatal ſalivation, ulcers in the mouth and throat, and incurable looſeneſſes.

Bohemia and Sileſia are ſomewhat ſofter and of a paler blue, and are improperly called by our Jewellers Water-Sapphires. Some of theſe gems have no colour at all, being pellucid as the cleareſt water, and reſembling a diamond; and others have a white milky caſt, with a ſlight tinge of blue amongſt it. They are found of various forms and ſizes, ſometimes three quarters of an inch, but ſeldom above one ſixth of an inch in diameter. A Sapphire of the deepeſt blue may be perfectly deprived of its colour by fire, ſo as to reſemble thoſe which are naturally colourleſs, and even to paſs for a diamond.——The Sapphires brought from the Eaſt-Indies are called Oriental, and thoſe found in Europe are termed Occidental; which latter, though often very beautiful, are inferior to the former both in luſtre and hardneſs.

THE Amethyſt is a gem of a beautiful colour, being a mixture of blue and red, which, as either of theſe tinges prevail, form different degrees of purple. Sometimes it is found quite colourleſs; and whether naturally ſo, or diveſted of its colour by means of fire, it is ſcarce to be diſtinguiſhed from a diamond, except by its degree of hardneſs. This gem is found of various ſizes, from that of a ſmall vetch, to an inch and a half in diameter; and its forms are likewiſe different, being ſometimes roundiſh, ſometimes ſhaped like a pear, but moſt commonly hexangular and pointed like cryſtals.—The oriental Amethyſts are generally reckoned the beſt, but ſome of thoſe found in Sileſia and Bohemia, as well as in other parts of Europe *, are little inferior to thoſe brought from the Indies, either in hardneſs or beauty.

BESIDES

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* Amethyſts are not uncommon in Italy; the Pyrenean mountains, and thoſe of Auvergne in France, afford very good

BESIDES the native foſſils we have here mentioned, and many more that might be added, Germany abounds with thoſe of the extraneous kind, which are bodies of the animal or vegetable kingdoms accidentally buried in the earth, ſuch as trees, leaves, herbs, ſhells, teeth and bones of fiſhes or land-animals, &c. which are found more or leſs altered from their original ſtate, according to the time they have lain, and the matter wherein they have been immerſed. Of theſe adventitious foſſils we have given a general account in ſpeaking of our own iſland, which affords them in great abundance; nor can the reader expect a particular deſcription of them, unleſs in treatiſes written profeſſedly on the ſubject. It is not improper, however, to obſerve, that whole trees, or conſiderable parts of them, are moſt frequently found in bogs or peat-earth, and ſometimes ſcarce altered at all, except in colour, the oaks in particular being commonly turned to a jetty black. Branches of trees are alſo found bedded in ſtrata of clay or ſtone, and fragments of wood, chiefly of oak, are ſometimes met with among gravel, and in ſeveral other ſtrata; and many of theſe being filled with cryſtalline or ſtony particles, but ſtill retaining the veins of wood, make a beautiful figure when they are poliſhed. Inſtances of wood perfectly petrified or changed into ſtone, at leaſt to appearance, are not uncommon; though

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good ones; and ſome of the fineſt ſort are dug out of a mountain near Vic in Catalonia, where they are lodged amongſt a reddiſh earth in the perpendicular fiſſures of the rock. —Some have pretended that the amethyſt worn on the finger, or drank in powder, prevents drunkenneſs, which they ſuppoſe is implied in the name; but this virtue, like many more aſcribed to gems and other ſtones, is only imaginary.

many ſubſtances have been miſtaken for petrified Wood, and preſerved as ſuch in the cabinets of the curious.—As to the ſmaller plants and leaves of trees, they are moſt commonly found immerſed in a black ſlaty ſtone over the ſtrata of coal, but in Germany they are frequently contained in a whitiſh ſtone ſomewhat harder than chalk, as well as in ſlaty ſtones of different colours. Theſe plants are principally of the fern kind, and what is very ſurprizing, many of them ſeem not to be of European growth, but peculiar to America, and others are of ſpecies to us unknown. The leaves of trees moſt frequently found in Germany are thoſe of the willow, white thorn, and poplar; alſo the ſmall branches of box and thyme, ears of barley, and moſſes of various kinds, are there met with in great perfection.—We ſhall ſay nothing of the ſeveral ſpecies of corals buried in the earth, becauſe ſome will not allow them to be extraneous foſſils, but to have belonged originally to the mineral kingdom. Of animal ſubſtances, particularly ſhells, teeth, bones, &c. we find an almoſt infinite variety, and ſometimes complete fiſhes, either cloſely bedded in ſtone, or in ſtrata of a looſer nature; and amongſt theſe bodies it is not uncommon to find in this part of the world the ſhells of fiſhes belonging only to diſtant ſeas, as well as ſeveral unknown ſpecies. As to land-animals, we have perhaps no inſtances of their being found entire in the earth; but parts of them are very common, and that in ſuch places and quantities as make it really amazing to conſider. The tuſks and grinders of elephants, the horns of deer, the teeth of horſes and other quadrupeds, and the larger bones of divers kinds of animals, are often found looſe in the earth, and ſometimes immerſed in the hardeſt ſtone. Some of theſe, by the coppery particles they have lain amongſt, become ſpotted and veined with blue, which colour being diffuſed through them by putting them in a gentle fire, they very much reſemble the native turquoiſes, ſo as to deceive the jewellers themſelves: and what we call the Unicorn-ſtone, the Unicorn foſſil of the ſhops, is nothing but ſuch a bony ſubſtance impregnated with a kind of earthy ſpar, found commonly enough in the caverns of Germany. The parts of fiſhes are much more frequent in the foſſil world, than the whole bodies of them; and yet Germany and other countries afford us many inſtances of entire fiſhes found immerſed in ſtone, flatted indeed, but perfect in their forms, and eaſily diſtinguiſhed as to their ſeveral ſpecies. The Gloſſopetræ, vulgarly ſuppoſed to have been the tongues of ſerpents petrified (from whence their name) are found in vaſt numbers in Germany *, and are now well known to be the teeth of ſharks or other fiſhes; and ſeveral miſtakes, with reſpect to the origin of foſſil bodies, may probably be yet diſcovered by more accurate enquiries. As to foſſil ſhells, which are much the moſt numerous claſs of animal ſubſtances buried in the earth, they are found in moſt parts of the world, and many of them are extremely beautiful; but we muſt not attempt to deſcribe them, their variety being almoſt endleſs.

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* The Gloſſopetræ are common enough in many parts of the world, but no where ſo frequent as in the iſland of Malta. They are ſuppoſed good againſt poiſons, and particularly the bites of ſerpents; which virtue ſeems to be ſuperſtitiouſly aſcribed to them from the viper's faſtening upon St. Paul's hand without doing him any harm; and ever ſince, ſay they, no venomous creature will live upon that iſland.—But the origin of thoſe foſſils is now ſo well known, as to deſtroy the foundation of that vulgar notion.

Here, according to our method, we ſhould give an account of the Vegetables and Animals of the countries we are ſpeaking of; but as theſe articles would afford us nothing particularly remarkable, we chuſe to paſs them over, and proceed to a deſcription of ſome miſcellaneous curioſities, which are not reducible to any certain heads.

Miscellaneous Curiosities.

SEVERAL towns in Germany are noted for tuns or wine-vats of an uncommon ſize, but that of Heidelberg, which ſtands in a vaſt cellar under the elector's caſtle, is of all others the moſt celebrated. The firſt we hear of was large enough to contain 528 hogſheads of wine, but this was rebuilt in 1664, and made to hold 600 hogſheads Engliſh meaſure. The old one had iron hoops, each weighing above 1200 pounds; but the new one was girt about with very ſtrong ones of knee-timber, adorned with paintings and inſcriptions, and ſupported by carved pedeſtals: there was alſo a ſtair-caſe, of forty-three ſteps, which led to the top of it, where the electors themſelves have had frequent carouſals. This we apprehend was the tun that Dr. Burnet (afterwards biſhop of Sarum) ſaw at Heidelberg in 1686, which he ſays was ſeventeen feet high, twenty-ſix feet long, and built with a ſtrength more like that of the ribs of a ſhip than the ſtaves of a tun. It is ſaid this prodigious veſſel was emptied and broke to pieces by the French in 1688, but that another was afterwards made of a yet larger bulk, which perhaps is ſtill in being.

The tun of Konigſtein, built by order of general Kyaw, is however ſtill larger, its length being ſeventeen Dreſden ells, and its diameter at the bung twelve ells. It conſiſts of one hundred and fifty-ſeven ſtaves, eight inches thick, and fifty-four boards for the heads. It holds 3709 hogſheads of wine; and upon one head of the caſk is a Latin inſcription. The top of the caſk is railed in, and affords room for fifteen or twenty people to regale themſelves.

THE mentioning a caſk of ſo enormous a ſize puts us in mind of another curioſity in Germany, namely, the great bell at Erfurt, which is reckoned the largeſt in Europe, weighing upwards of twelve tons, being near eleven feet in height, and about as many yards in circumference *. We are told the ſound of this bell may be heard at the diſtance of four and twenty miles, which does not appear utterly imbrobable †.

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* This is far beyond the weight and dimenſions of our Great Tom of Oxford, which is computed to weigh near ſeven tons and a half, and is above ſeven feet in diameter. And yet the bell of Erfurt is not to be compared for weight with ſeveral in China, if we may believe the accounts given us by father Le Comte, who tells us of ſome in Pekin that weigh 120,000 pounds; but indeed we have ſcarce faith enough to credit him in this particular.

† It may perhaps ſeem ſtrange to ſome people, to tell them that the ſound of bells which hang in plains and valleys may be heard farther than thoſe which are placed upon hills; the reaſon whereof will be underſtod by conſidering, that as air is the medium of ſound, the higher the ſonorous body is placed, the more rarified is that medium, and conſequently the leſs proper vehicle to convey the ſound to a diſtance. We may alſo obſerve, that the ſound of a bell ſtruck under water is a fourth deeper than in the air, as Mr. Hawkſbee and others have found by experiment; though Merſenne ſays it is of the ſame tone in both elements.—As to the diſtance to which ſounds may be ſent, divers experiments have been made, to try whether there was any difference in that reſpect

As great curioſities as ſome perſons may reckon the tun of Heidelberg or the bell of Erfurt, there is ſtill a greater, or at leaſt a work of more labour, to be ſeen about a league from Fribourg in Switzerland. It is called Magdalen's Hermitage, and is deſcribed by M. Blainville and our countryman Mr. Addiſon, who both ſaw it, as ſituated among woods and rocks, in the prettieſt ſolitude imagin-

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between the northern and ſouthern parts of the world. Guns were tried for this purpoſe at Florence, and perſons appointed to obſerve them near Leghorn heard the report plainly enough, though the diſtance is little leſs than 55 miles in a ſtrait line. The Leghorn guns are often heard at Porto Ferraio, which is above 60 miles off; and when the French bombarded Genoa, they heard it at Monte Nero near Leghorn, upwards of 90 miles diſtant: nay, people of good credit have affirmed, that at the ſiege of Meſſina, the report of the guns was heard at Auguſta and Syracuſe, about 100 Italian miles. Theſe diſtances being ſo conſiderable, induced Dr. Derham to ſuſpect, that ſounds fly as far, or nearly as far, in ſouthern as in northern climates, notwithſtanding we have ſome inſtances of their being propagated to greater diſtances in the northern parts of the world, than any above-mentioned: for Dr. Hearn informed our royal ſociety, that the guns fired at Stockholm in 1685 were heard almoſt 180 Engliſh miles; and in the naval engagement between the Engliſh and Dutch in 1672, the report of their guns was heard above 200 miles off, even as far as Shrewſbury and Wales.—With reſpect to the velocity of ſound, the moſt celebrated philoſophers differ about it; but Dr. Derham, by the niceſt experiments, found that it flies at the rate of an Engliſh mile in nine half-ſeconds and a quarter, or 1142 feet in one ſecond of time: and in this he agrees with Mr. Flamſtead and Dr. Halley. The ſame gentleman obſerved, that there is ſome difference, though a very ſmall one, in the ſwiftneſs of ſounds with or againſt the wind, or according as the wind is ſtronger or weaker, but that nothing elſe accelerates or retards their motion; that they fly equal ſpaces in equal times; and that all kinds of ſounds, whether of bells, guns, or any other ſonorous bodies, or whether loud or languid, move with the ſame degree of velocity.

able. The hermit (they ſay) who was then alive, had worked out of the rock a pretty chapel, with with an altar, ſacriſty, and ſteeple; alſo five chambers, a parlour, refectory, kitchen, cellar, and other conveniencies. The ſunnel of his chimney, which pierces from his kitchen to the top of the rock, ſlanting all the way, is 90 feet high, and coſt him ſo much toil, that he was a whole year about it, and often deſpaired of finiſhing his deſign. All this muſt appear the more ſurprizing when we conſider the dimenſions of the different parts of this hermitage, the chapel being 63 feet in length, 36 in breadth, and 22 in height. The ſacriſty, or veſtry, is 22 feet ſquare, and the height of the ſteeple 70 feet. The chamber between the chapel and the refectory is above 40 feet long, the refectory itſelf is 21, and the cellar is 25 feet long, and 10 feet deep. But the hall or parlour is particularly admired, being 28 paces in length, 12 in breadth, and 20 feet in height, with four openings for windows, much higher and wider than thoſe of our beſt houſes. At one end of this hall was the hermit's cabinet, with a ſmall collection of books and other curioſities. To add to the pleaſantneſs and convenience of this habitation, he had cut the ſide of the rock into a flat, and having covered it with good mould had formed a pretty garden, planted with divers ſorts of fruit-trees, herbs, and flowers; and by following the veins of water that dropped from ſeveral parts of the rock, he had made himſelf two or thre fountains, which ſupplied his table, and watered his little garden. This hermit, whoſe name was Jean du Pré, began this laborious undertaking at the age of thirty, and ſaid he was twenty-five years in compleating it, having had no ſort of aſſiſtance from any perſon whatſoever except one ſervant.

He intended to have carried on his work ſtill farther, but was drowned in 1708, as he was croſſing a neighbouring river in a boat with ſome company that came to viſit him on St. Antony's day, the patron of his chapel. His place is ſupplied by a prieſt, who ſubſiſts by the generoſity of ſtrangers that come to ſee the hermitage, whom he generally entertains with bread and wine and a noſegay.

We might mention here many other things which are deſcribed as wonders by thoſe who have travelled in theſe countries; but as they ſeem to have much of the air of fable, we think it would be waſting our own and our readers time to amuſe them with ſuch uncertainties. The article of Antiquities comes next in order, but as the countries we are now ſurveying furniſh nothing of this kind that is very material, (though noble remains of Roman works are to be found in ſeveral places) it ſeems beſt to omit this part of our ſubject, and proceed to that of Buildings.

BUILDINGS.

OUT of ſuch a multitude of fine ſtructures, both churches and palaces, as we meet with all over Germany, it is difficult to determine which are moſt worthy of our notice, eſpecially as we cannot ſpare room for many of them to be particularly deſcribed. We ſhall begin, however, with the cathedral church of Vienna, dedicated to St. Stephen, which is a moſt ſtately fabric and generally admired, though ſome object againſt the darkneſs of the inſide, occaſioned by the painted glaſs of the windows. The ſteeple and ſpire is certainly one of the ſtrongeſt and loftieſt in Germany, being 465 feet high; and under the croſs on the top there were formerly the Turkiſh arms, viz. a half moon and ſtar, ſet up by the citizens when Solyman the Magnificent beſieged the city, becauſe he agreed to ſpare the ſteeple on that condition. This church contains many ſumptuous monuments of princes, and other great perſons, the altars are richly adorned, and upon the whole the beauty of the inſide is anſwerable to its majeſtic appearance without.

THE cathedral of Saltzbourg is a magnificent edifice of freeſtone, having a very ſtately front, and reckoned one of the compleateſt in Germany. It is built in form of a croſs, with a lofty dome which ſeparates the nave from the choir. The inſide of the church is adorned with pilaſters of the Corinthian order, and the pavement conſiſts of great ſquares of marble of various colours. The high altar is of beautiful marble, whereon is placed, on grand feſtivals, a ſun of gold, ſet with precious ſtones of immenſe value; alſo a large croſs of ſolid gold, and four golden candleſticks. Here is an organ remarkable for its largeneſs, beſides four others of a leſſer ſize; and amongſt the principal ornaments of this church we may reckon four marble ſtatues bigger than the life, of St. Peter, St. Paul, St. Rupert, and St. Virgilius, of whom St. Rupert is ſaid to have been the firſt biſhop of Saltzbourg.

THOSE who have a taſte for Gothic ſtructures will ſcarce find any in Germany more beautiful than the cathedral church of Bamberg in Franconia, which is a vaſt edifice, having a lofty ſteeple and four noble ſpires of bold workmanſhip, ſupported by tall pillars that appear very light and eaſy: but perhaps a ſhort account of the treaſure it contains may be more agreeable than a deſcription of the building. The emperor Henry ry II. was the founder of this biſhoprick, and his tomb with that of his conſort are to be ſeen in this cathedral, beſides very fair ones of ſeveral of its biſhops. In the treaſury of the church is ſtill preſerved the imperial crown of the ſaid emperor, conſiſting of ſix plates of gold adorned with precious ſtones; and another of his empreſs compoſed of two circles of gold, ſet alſo with pearls and jewels. Here is a ſtatue of the virgin five feet high, all of ſolid ſilver; and another of St. George on horſeback combating the dragon, which is of ſilver gilt, and ſeven feet high. Amongſt many other rich curioſities here are likewiſe two fine vaſes of porphyry, a portable altar of maſſy gold, a little tabernacle and a large chalice of the ſame metal, a ſhrine of gold for relicks, and a fine crucifix of rock-cryſtal, the Chriſt being of ſolid gold, and the whole adorned with rubies and emeralds. To theſe we may add a heavy croſs of gold eighteen inches long, and another yet larger of ſilver gilt, both given by the above-mentioned emperor. Nor ought we to forget one of the greateſt rarities of this treaſury, which is a folio manuſcript of the four goſpels in Latin, written upon fine vellum in a neat Roman character, with ſome Gothic letters interſperſed, and the moſt beautiful miniatures imaginable. The covers are of wood, curiouſly inlaid with figures in ivory repreſenting our Saviour's paſſion, and on a gold border are the heads of the Apoſtles, as are thoſe of the Evangeliſts at the four corners.—We need ſay nothing of the vaſt number of candleſticks, lamps, cenſers of gold and ſilver, and other utenſils belonging to this treaſury; the articles we have mentioned being ſufficient to give an idea of its riches, THE cathedral of Ulm in Swabia, now belonging to the Lutherans, is a lofty and well-proportioned ſtructure as any in the circle, and confeſſedly one of the fineſt in the empire. It is ſaid to have been above a hundred years in building, and that the very ſhell of it coſt 135,000 l. ſterling, excluſive of the windows, whereof there are ſix in the choir that are moſt beautifully painted. This church has a large ſquare tower, and five ſtately ſpires, one of which is ſupported by ſix and thirty pillars. The tabernacle, which formerly contained the conſecrated hoſt, is a curious piece of work, and ſaid to have coſt a hundred thouſand florins, being a ſingular kind of marble, and adorned with abundance of ſtatues. The choir is full of beautiful ſculptures, repreſenting pieces of ſcripture-hiſtory: nor muſt we forget its noble organ, which was more than twenty, ſome ſay more than thirty years in compleating. It is 39 feet high and 28 broad, has ſixteen pair of bellows, and above three thouſand pipes of Engliſh tin, of which the largeſt is thirteen inches in diameter *.

IF we look into the Auſtrian Netherlands, we find a great number of beautiful and ſtately churches, but none finer than thoſe at Antwerp. The cathedral of that city is a moſt magnificent ſtructure, being more than 500 feet long, and 230 broad; and its ſteeple (if it has not been deſtroyed by the rage of war, to which theſe countries have been ſo frequently expoſed) may be juſtly ranked amongſt the nobleſt in Europe. It is 466

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* As fine an organ as this is, Dr. Nicholſon thought it inferior to ours at Exeter, which is ſaid to have pipes of 15 inches diameter; and as to the number of pipes, we are told there is an organ at Lubeck conſiſting of ſix thouſand.

feet high, and is ſuch an excellent piece of architecture, that the emperor Charles V, when he made his entry into Antwerp, ſaid “ it ought to “ be put into a caſe, and ſhewed only once a year “ for a rarity.” The altars and chapels within this great church are finely adorned with paintings by Rubens, and other eminent maſters Amongſt theſe are ſome good pieces of Quintin Maſſey's, a blackſmith of Antwerp, whoſe ſtory is well known *.

We ought not to leave Antwerp without taking notice of the Jeſuits church there, a ſtructure which is equalled by few, and ſcarce excelled by any, whether we regard the materials, the workmanſhip, or the variety of fine paintings done by the celebrated Rubens. The inſide of it is lined with white marble, and the roof ſupported by columns of the ſame. The great altar is alſo of marble intermixed with gold, porphyry, and jaſper. The adjoining chapel of the Virgin

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* The ſtory is, that this blackſmith falling in love with a painter's daughter, aſked her in marriage; but her father told him, he would never give her to any one except a painter. Upon this the blackſmith went to Italy, applied himſelf to painting, and in a few years returned home a greater maſter than his ſweetheart's father, and accordingly married her. He is interred at the entrance of the cathedral of Antwerp, where his effigy is put up with this inſcription:

Connubialis amor de Mulcibre fecit Apellem.

Which we ſhall venture to give the reader in Hudibraſtic rhymes:

Love's pow'r (which very ſtrange to tell is)
A Vulcan chang'd to an Apelles.

But thoſe who don't know who Vulcan and Apelles were, may take it in plain Engliſh thus:

Love's pow'r (can any thing be quainter?)
Tranform'd a blackſmith to a painter.

is no leſs beautiful, where Rubens has painted the Aſſumption over the altar, which he uſed to call his favourite piece; and round it are ſix ſtatues of alabaſter, repreſenting the founders of the chapel.

FOR fear of dwelling too long on a ſubject which is not univerſally pleaſing, we ſhall only mention one more ſtructure of this kind, viz. the great church at Bern in Switzerland, which is a very magnificent fabric, and may be deemed a maſter-piece in Gothic architecture. It has a fine lofty ſteeple, and is remarkable for having the largeſt bell in Switzerland, weighing ten tons and upwards. The great door is adorned with a repreſentation of the parable of the wiſe and fooliſh virgins; and the ſculptures in general, both within and without, are very well executed. There are alſo ſome admirable paintings in this church, for which it is ſaid great ſums have been offered by the people of Lucerne. In Mr. Addiſon's opinion, this is one of the moſt magnificent proteſtant cathedrals in Europe; and Dr. Burnet ſays, it is a very noble ſtructure; but he adds, that being built on the top of a hill, the ground began to give way from the foundation, ſo that to ſecure the church they have raiſed a vaſt platform which coſt more than the church itſelf. The platform is ſupported by a thick wall ſtrengthened with buttreſſes, about a hundred and fifty feet high; and this lofty walk is much frequented by company, eſpecially in the evening, as it affords a beautiful proſpect.

AS we are now going to take a view of ſome of the moſt ſtately palaces of Germany, it may be expected we ſhould firſt caſt an eye on thoſe belonging to the imperial family; but if we believe baron Pollnitz, who repreſents them as ſtructures not at all ſuitable to the grandeur of an emperor, they do not ſeem to merit our attention. We ſhall however deſcribe one of the palaces belonging to prince Eugene and prince Lichtenſtein.

THAT of prince Engene is extremely magnificent, and conſiſts of four ſtories; but the apartments and ſtair caſes are ſomewhat darkened by the houſes on the other ſide of the ſtreet. In the front are three doors opening into ſo many balconies, and in every ſtory are ſeventeen windows. The roof is flat, in the Italian taſte, and adorned with eighteen large ſtatues. In one of the anti-chambers are fine paintings, repreſenting the battles of Hochſtet, Zenta, and four others; but the piece which firſt ſtrikes the eye, is the relief of the city of Turin. Among the beautiful tapeſtry, that repreſenting a ſhipwreck is particularly admired. Some of the apartments are hung with crimſon velvet, eſpecially that in which the late prince Eugene gave audience to the Turkiſh ambaſſador, under a canopy, and in a chair of ſtate. The ſtove in this room is made of braſs, and repreſents Hercules vanquiſhing the Hydra.

NOTHING can be more beautiful than the looking-glaſs chamber; and indeed every part of this ſuperb palace is embelliſhed with exquiſite pictures, glaſſes of all kinds, and fine chimney-pieces. The library contains fourteen thouſand volumes, which are moſtly folios, and being bound in red Turky gilt, make a fine appearance.

THE prince of Lichtenſtein has three palaces in Vienna; but one in the Heron ſtreet is the moſt magnificent. The front is adorned with columns and ſtatues, and the palace furniſhed in the Italian taſte with ſculptures, paintings, and antiques. Among the paintings are ſeveral pieces by Rubens and Raphael. The ſaloon is elegant and lofty, the vaulted roof was painted by Bellucci, who alſo painted the ceiling of the firſt and ſecond ſtories.

We ſhall now proceed to the elector of Bavaria's palace at Munich, which is a noble ſtructure fit for the reception of the greateſt monarch in Europe, with his guards and attendants. According to the marquis Pallavicino, who has given a full deſcription of it, it contains eleven courts, ſix chapels, twenty halls, two thouſand ſix hundred large windows, nineteen galleries, ſixteen great kitchens, twelve large cellars, and forty apartments all on a floor, in which are three hundred rooms richly furniſhed, and filled with paintings, ſtatues, relievos, and other ornaments. One objection indeed is made to this fine building, viz. that its chief front, which looks towards a narrow ſtreet, has the reſemblance of a convent, to which the image of the Virgin Mary over the great gate contributes not a little; and it is alſo obſerved, that having been built at ſeveral times, the architecture is ſomewhat irregular. The beauty of the inſide, however, is confeſſed on all hands; but that called the emperor's apartment is particularly admired. The great hall of this apartment is a hundred and eighteen feet long, and fifty-two broad, and is adorned with curious pictures of ſacred hiſtory on one ſide, and profane on the other. The chimney-piece is alſo embelliſhed with fine figures, amongſt which is a ſtatue of porphyry, repreſenting Virtue with a ſpear in her right hand, and a palm-branch in her left. It is ſaid that Guſtavus Adolphus, king of Sweden, was ſo delighted with this hall, that he was ſorry he could not get it tranſported to Stockholm.—But the late elector added a new apartment to this palace, which, though not ſo large as the emperor's, ſurpaſſed it in elegance and ſplendor. It was adorned with excellent paintings, and abundance of antique buſts and vaſes, placed upon tables of great value; but in the year 1730 this new apartment was burnt down by a fire which broke out in the night-time, ſo that ſcarce any of the fine furniture was ſaved, and the elector and his conſort narrowly eſcaped the flames. In the little chapel belonging to the apartment of the electreſs, hardly any thing was to be ſeen but gold, pearls, and jewels. The furniture of the palace in general was rich beyond imagination; and in the treaſury were whole ſervices of gold-plate and other coſtly veſſels, with an incredible number of diamonds, rubies, and other precious ſtones. Add to theſe the many fine paintings, ſtatues, buſts, &c. with which the galleries, halls, ſtair-caſes and chambers were adorned; beſides a very valuable library, and a vaſt collection of coins, medals, and other rarities both ancient and modern. But how much of the rich furniture and treaſure here mentioned is ſtill remaining in this electoral palace, we cannot pretend to ſay with any tolerable degree of certainty *.

FROM

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* It is proper to obſerve, that the late elector, in his neceſſities during the war at the beginning of this century, was obliged to make uſe of ſome of the treaſure above-mentioned, and a great deal more was ſeized by the Imperialiſts when they were in poſſeſſion of Munich, though afterwards they engaged by treaty to reſtore what they had taken away: and it is reaſonable to ſuppoſe, that in the late war the Auſtrians did not leave the rich moveables of this palace untouched, unleſs the elector took care to have them conveyed away before they made themſelves maſters of his capital.—As to accounts of buildings and the moveables they contain, a judicious reader need not be told, that he muſt not always expect them to be entirely free from miſtakes, but make proper allowances

FROM Munich let us make a ſhort excurſion to the elector's palace of Nymphenbourg, where the court frequently reſides; which is charmingly ſituated in the middle of a large plain, and affords from the windows of the ſecond ſtory a proſpect of innumerable rural beauties. The grand avenue leading to this palace conſiſts of a double row of elms on each ſide of a noble canal, which at each end has a ſpacious baſon adorned with water-works. By a flight of marble-ſteps, we aſcend into a very large and lofty ſaloon, from whence on each hand there is a paſſage into ſeveral apartments richly furniſhed; and having croſſed this ſpacious hall, we deſcend by marble ſteps into the gardens. Here the firſt thing that ſtrikes the eye is a parterre of a vaſt extent, at the entrance of which there is a great baſon, with a group of gilt figures in it, repreſenting Flora receiving flowers from Nymphs and Cupids. This parterre is terminated by a moſt delightful wood, through which are cut three walks, whereof the middlemoſt fronts the grand pavilion of the palace, and has a large canal running the whole length of it, and ending with a fine caſcade. The walk on the right hand leads to a ſemicircular mall, at the entrance of which is a pretty pavilion called Pagodebourg, being built in the form of a Pagod * or Indian temple; and the furniture of this little palace is entirely Indian, all ſur-

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lowances for the alterations occaſioned by the fancy or neceſſity of the owner, and the calamities of war, fire, or other accidents.

[*] This name the Portugueſe have given to the temples of the Indians, Chineſe, and other eaſtern idolaters. It is alſo uſed to ſignify the idol adored in the temple; and is likewiſe the name of a gold coin current in ſeveral parts of the Indies.

prizingly neat and elegant. In the walk on the left hand is a larger building called Badenbourg, (or the bathing-houſe) the baths whereof are ſpacious, lined with marble, and adorned with ſtatues and vaſes; and there is alſo an apartment richly furniſhed, and embelliſhed with gildings, paintings, and other ornaments. This fabric is ſurrounded with fine pieces of water, caſcades, and ſtatues; and, in a word, both art and nature ſeem to have ſtrove to render theſe gardens magnificent and delightful.

THE biſhop of Bamberg has two palaces in that city, the old, and the new; of which the latter is a vaſt pile of free-ſtone, three ſtories high, with a very regular front between two noble wings, containing grand and commodious apartments, well furniſhed, and adorned with excellent paintings. The building is modern, having been erected by the laſt biſhop, who alſo built Pommersfelden, a country-palace or hunting-ſeat about eight miles from Bamberg, reckoned one of the moſt beautiful and compleat ſtructures in the empire. It is likewiſe of free-ſtone, built in the form of a ſquare, with four large towers, one at each corner; and all round the court within there is a noble piazza. Here is a magnificent ſtair-caſe, and one of the beſt-contrived in Europe, which is beautifully painted, as well as the cielings of the principal apartments. The ſaloon which ſerves as a paſſage to the garden is alſo finely painted, and adorned with marble ſtatues; and all the furniture and ornaments of the palace, as well as the apartments themſelves, are diſpoſed with the utmoſt elegance and judgment.

HIS Pruſſian majeſty's palace at Berlin, the capital of the electorate of Brandenburg, is a ſtately fabric of free-ſtone, conſiſting of four ſtories. It was begun by Frederic I. in 1699, and having been the work of ſeveral architects, the fronts are not exactly regular. The apartments are large, the cielings lofty and beautifully painted, and the furniture truly royal, there being particularly ſuch a quantity of ſilver, as is ſcarce to be parallelled in any other palace in Europe. Moſt of the tables, ſtands, looking-glaſs frames, chandeliers, ſcreens, &c. are of that metal; and there is a beaufet, which takes up one entire ſide of a room, filled with ciſterns, large baſons, and other veſſels of ſilver gilt. There is a fine gallery in this palace, adorned with admirable paintings, done by the beſt maſters; and on the cieling are repreſented the principal actions of the late king. On the ſide next the garden is a noble library, and near to it is a cabinet of rarities with a choice collection of medals.

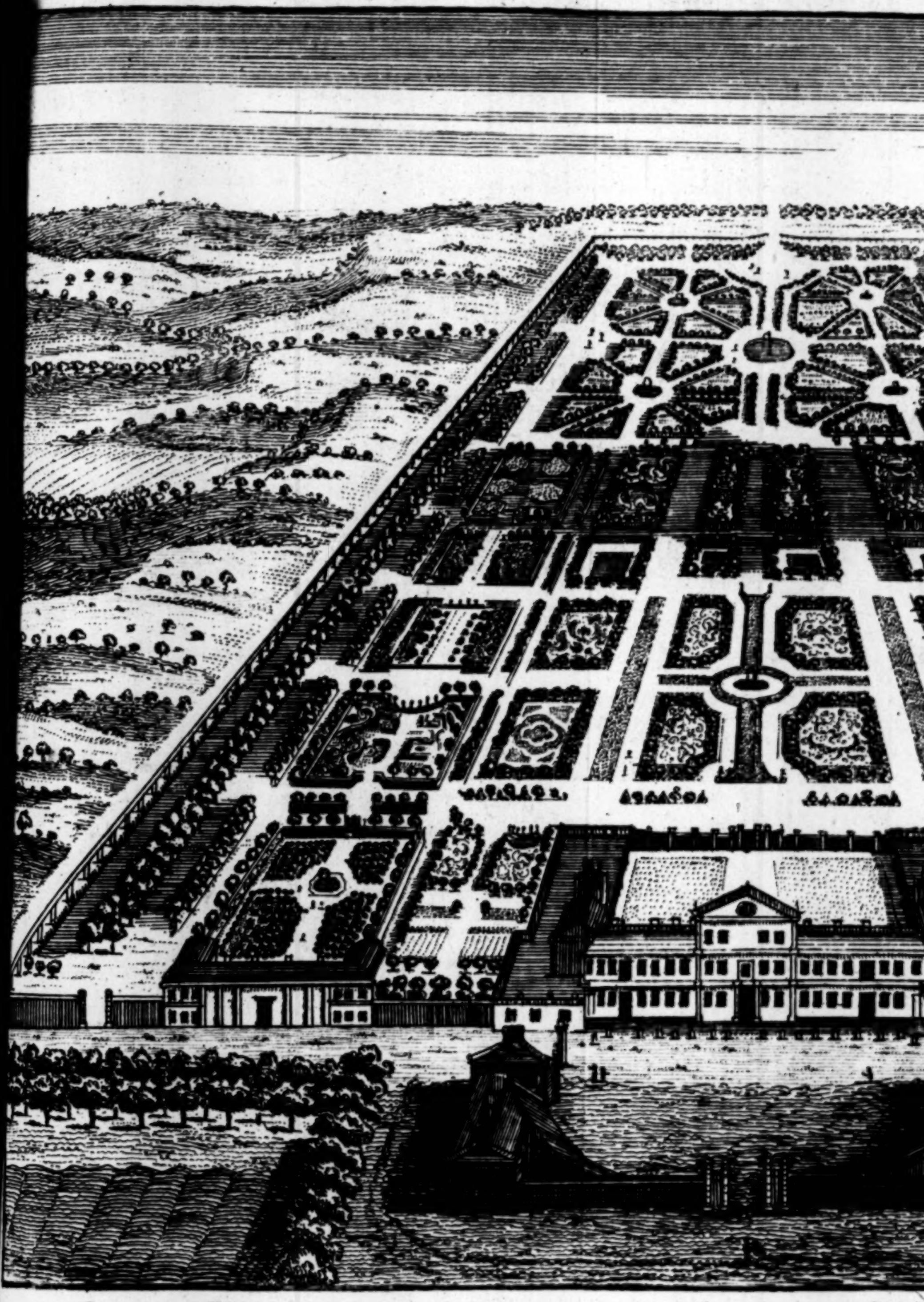
THE arſenal in the ſame city is one of the nobleſt ſtructures of the kind in Europe, and conſiſts of four grand buildings that form a ſpacious ſquare, with a handſome portico at the entrance of each front. The lower ſtory is of ruſtic architecture, with arched windows. And over the principal gate, which is in the middle of one of the fronts, is the king's grandfather in braſs gilt, encloſed in an oval frame: the four cardinal virtues of a gigantic ſize, are placed on pedeſtals on each ſide of the portico, over which is his majeſty's cypher ſupported by two men, and above it a large pediment covered with a beautiful baſſo relievo, repreſenting Mars reſting on a trophy, and looking at two ſlaves chained at his feet. The firſt ſtory is of the Corinthian order, and a fine balluſtrade runs round the top with noble decorations of trophies and ſtatues.

The opera-houſe, which alſo belongs to the king, is one of the moſt elegant ſtructures of the kind in the world. The front is adorned with a noble portico, above which is a pediment embelliſhed with baſſo relievo and ſtatues.

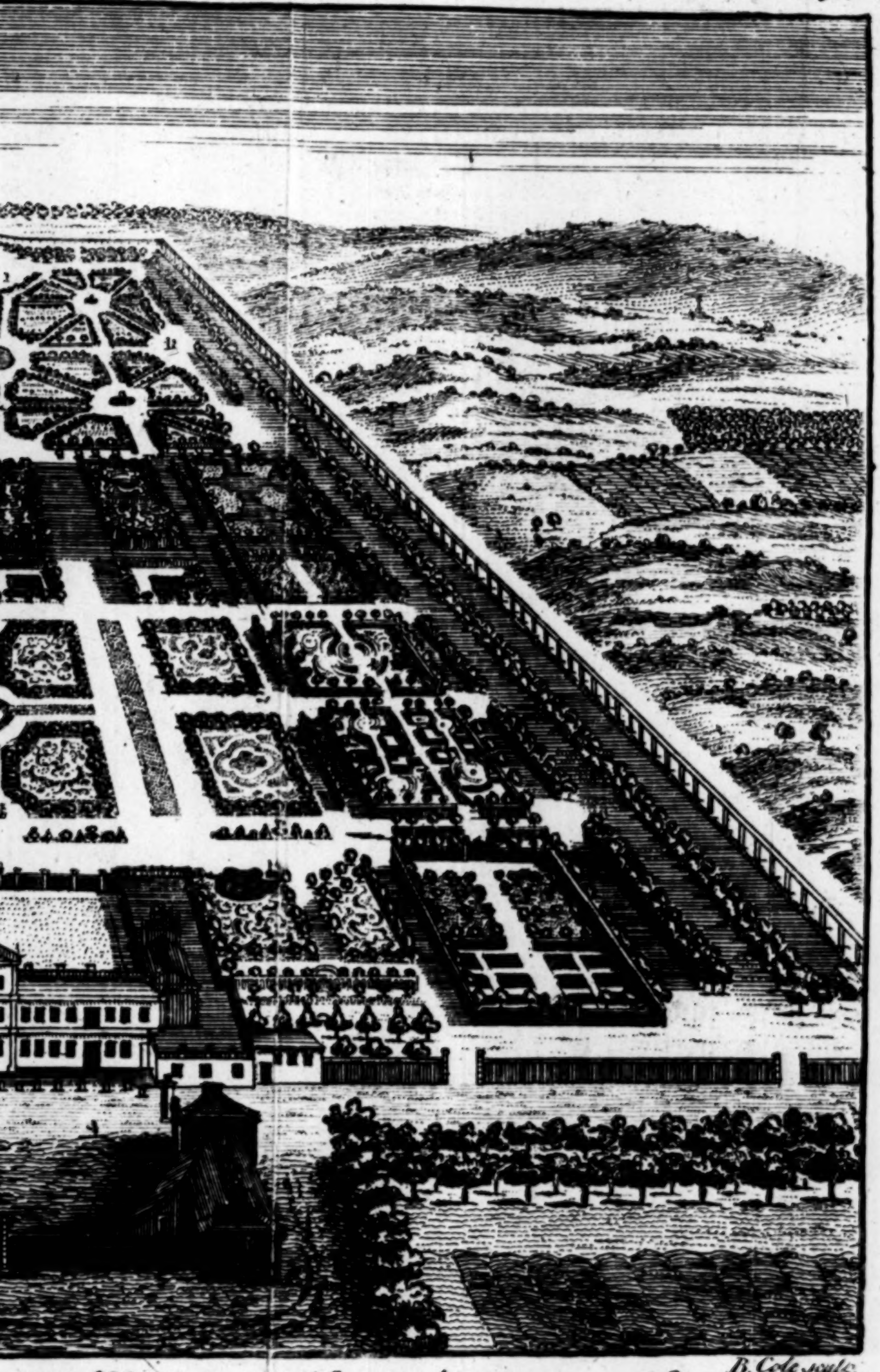
We ought not here to omit the palace named Sans Souci, or Without Care, which ſtands near Potſdam, and is particularly devoted to retirement. King Frederic II. cauſed this palace to be erected on a deſolate eminence, in a fine and grand taſte both within and without. This eminence is cut into ſix terraces, to each of which is an aſcent of twelve ſteps, and againſt the walls upon each terrace are planted vines. On the top of the hill, which affords a view of the town, and the adjacent country, ſtands the palace, which tho' ſmall, and only one ſtory high, is much admired, on account of its elegance, regularity, and ornaments of ſculpture and painting; among theſe is to be ſeen the ſtatues from the cabinet of antiques, formerly in the poſſeſſion of cardinal Polignac. In the centre of the palace is a round hall lined with marble, adorned with magnificent columns, and excellent paintings. On the top is a cupola which ſupplies it with ſufficient light; but this room is particularly admired for the beauty of its floor, which is of marble, diſpoſed in the form of flowers, after the Florentine manner, and ſtrikes the eye very agreeably. One of the apartments is wainſcotted with cedar, ornamented with foliages of gold, and contains a ſmall library. Behind the palace is a covered ſemicircular paſſage, adorned on each ſide with columns. The palace is encompaſſed on three ſides with gardens, which have ſeveral fine ſtatues, particularly Venus drawing a net, and Diana with game, the pedeſtals of which are adorned with relievo. The gardens, which do not extend above half an Engliſh mile in length, are terminated on the eaſt end by an Egyptian pyramid embelliſhed with hieroglyphicks.

SOME might think it a blameable omiſſion, if we ſhould not take notice of his Britannic majeſty's palace of Herenhauſen near Hanover; but we think it unneceſſary to deſcribe the ſtructure, as it is chiefly famous for its beautiful gardens, which in ſome reſpects are thought equal to any in France, and ſuperior to moſt in the empire. The walks are laid out in the moſt elegant manner, the wilderneſs of ever-greens is charming, and here is one of the largeſt and nobleſt orangeries in Europe; alſo a perfect theatre cut in green ſeats, with arbours and ſummer-houſes for the actors to dreſs in, or retire to as occaſion requires. They are adorned throughout with ſtatues, vaſes, and whatever elſe is neceſſary to render them noble and delightful; but above all, they are admired for their beautiful fountains, caſcades, and other water-works.

WE ſhall conclude this article with a brief deſcription of the magnificent town-houſe at Augſbourg, a ſtructure which merits obſervation as much as any thing of the kind in Germany. It is a large ſquare building, all of free-ſtone, except the portico, which is of reddiſh marble, crowned with a balcony of the ſame, ſupported by ſtately columns of white marble. At the top of the front juſt below the pediment, there is a large ſpread-eagle in braſs, which holds in its talons a globe and ſceptre, the whole ſaid to be two and twenty hundred weight, and to have coſt above 1800 l. ſterling: and over the gate are the city-arms, ſupported by two brazen Griffins, all of excellent workmanſhip. The great hall, which



A View of the Palace & Gardens belonging to his Britannick Maj



B. Cole sculp.

nick Majesty at Herrenhausen near Hanover.

is 110 feet long and 58 broad, is paved with marble, and enlightened by 52 windows, and adorned with fine paintings and ſtatues in niches. The cieling is divided into a vaſt number of compartments, the ſquares and pannels whereof are embelliſhed with fine gilded ſculptures and other ornaments. From this hall we aſcend into another of equal beauty and magnificence, the workmanſhip of the cieling being admirable, and every part of it adorned with a profuſion of fine ſculpture, gilding, and painting. In the four adjoining chambers, each forty feet ſquare and nineteen in height, which are covered with excellent pictures, the magiſtrates give audience to the envoys of the emperor, the electors, and other ſovereign princes. There are likewiſe ſeveral chambers for the council, the court of juſtice, &c. all of them filled with fine paintings, and over the doors are the buſts of Pagan and Chriſtian emperors. Amongſt the many curious paintings to be ſeen about this noble edifice, there is one in freſco upon a wall, which is fifty feet long and twenty high, repreſenting Solomon in all his glory receiving the queen of Sheba.—This general deſcription may ſuffice, without deſcending to particulars.

Cuſtoms of the GERMANS.

WE ſhall begin the cuſtoms of the Germans with obſerving, that on the Saint's day of the name of any of the Imperial family operas are exhibited, which for the magnificence of the theatre, the ſplendor of the decorations, the richneſs of the habits, and the performance in the orcheſtre, are ſaid to ſurpaſs any thing of the kind in Europe. Theſe days are called days of Gala;

and the ladies of quality, whenever they are diſpoſed to diſplay the magnificence of their apartments, or oblige a friend by complimenting them on the day of their ſaint, make known that on ſuch a day will be their Gala; when all the relations and friends of the lady, whoſe ſaint it is, are obliged to appear richly dreſſed, and in all their jewels; the miſtreſs of the houſe takes no particular notice of any body, nor returns any body's viſit. The company are ſplendidly entertained, and afterwards divide into ſeveral parties at cards, or converſation, all games of hazard being forbidden.

THE pride of rank is an eternal ſubject of quarrels among the great, none being willing, upon any condition, to deſiſt from their pretenſions, where they imagine their rank concerned. A very learned lady, whoſe huſband was there in a public character, obſerves in her letters, that they are never lively but upon points of ceremony; and mentions two coaches, which meeting in a narrow ſtreet at night, the ladies in them were unable to adjuſt the ceremonial of who ſhould put back to make way for the other; and therefore ſat with equal gallantry, till two in the morning, when the emperor ſending his guards, they were both taken up exactly at the ſame moment, and carried away in chairs. The men are equally touched with this point of honour, and not only ſcorn to marry, but even to make love to a woman of a leſs illuſtrious family than their own.

THE lady Wortley Montague viſiting one of their operas, ſays, the ſtage was erected over a very large canal, and at the beginning of the ſecond act, divided into two parts, diſcovering the water; on which there immediately came, from different parts, two fleets of little gilded veſſels, which engaged in a naval combat. The above lady ſays, it is not eaſy to imagine the beauty of this ſcene; and all the reſt were perfectly fine in their kind. The ſtory of the opera was the enchantment of Alcina, which afforded an opportunity for a great variety of machines and changes of the ſcenes, which were performed with ſurprizing ſwiftneſs. The theatre was of an amazing extent, and the habits in the utmoſt magnificence; but the ladies ſitting in the open air, expoſes them to great inconveniencies, there being but one canopy for the Imperial family.

THE ſame ingenious lady has deſcribed another common amuſement of that court. The empreſs was ſeated on a little throne at the end of a fine alley in her garden; and on each ſide of her were ranged two parties of the ladies of quality, headed by two young archdutcheſſes, all dreſſed in their hair, full of jewels, with fine light guns in their hands; and at proper diſtances were placed three oval pictures, which were the marks to be ſhot at. The firſt was that of a Cupid filling a bumber of Burgundy, with the motto, It is eaſy to be valiant here. The ſecond, Fortune holding a garland in her hand, and the motto, For her whom Fortune favours. The third picture was a ſword, with a laurel wreath at the point, and the motto, Here is no ſhame to the vanquiſhed. Near the empreſs was a gilded trophy, wreathed with flowers, formed of little crooks, on which hung rich Turkiſh handkerchiefs, tippets, ribbons, laces, &c. for the ſmall prizes. The empreſs gave the firſt with her own hand, which was a fine ruby ring, ſet round with diamonds, in a gold ſnuff-box: the ſecond prize was a little Cupid, ſet with brilliants: beſides theſe, there was a ſet of fine China for the tea-table, japanned trunks, fans, and many other things.

All the men of quality were ſpectators, but the ladies alone had permiſſion to ſhoot.

AMONG the diverſions of the Germans, is riding through the ſtreets on the ſnow in ſledges, richly carved and gilt, drawn by horſes, adorned with ribbons, feathers and bells. The emperor, the empreſs and archdutcheſſes, attended by the principal courtiers, frequently perform this paſtime attended by muſic.

AMONG the diverſions alſo practiſed by the great, is hunting, particularly the wild boar; on theſe occaſions the princes of this country make great preparations of new liveries, rich field equipages, and muſic, being attended with a numerous retinue.

THE Germans are generally tall and well made: they are remarkable for their honeſty; the fairneſs of their dealing, and their hoſpitality. Their courage and bravery is not diſputed; and with reſpect to learning, they are not inferior to any nation in Europe. As to their vices, they have been cenſured for their drunkenneſs; but they do not ſeem to be more guilty of this vice than the Engliſh; nor is it practiſed among perſons of high rank, either there or in Great Britain, ſo much as formerly. Their drink is beer and wine; and they have the latter upon very eaſy terms, for they have not only ſeveral wines of their own growth, but thoſe of Hungary, France, and Italy, which lie contiguous to them, and where the beſt wines are produced.

WITH reſpect to their food, it generally conſiſts of beef, mutton, pork, fowls, &c. as among us; but they are more thoroughly roaſted and boiled than in England. They have one diſh, which was greatly eſteemed by the ancient Romans, as it is by them; and that is ſnails, which are dreſſed in various manners, and eaten as a great rarity by perſons of quality: the ſnails are fed for this purpoſe, ſo as to grow to an extraordinary ſize; and there is ſcarce a nobleman's garden, that has not a place ſet apart for breeding and fattening them.

AMONG the peculiarities of this country, inſtead of the chearful fire-ſide, they heat their rooms with ſtoves. And not only ſleep on a feather bed, but inſtead of blankets, have a light feather bed covering, laid upon the upper ſheet, and covered with a countepane.

ARTS, INVENTIONS, &c.

THE genius of the Germans has appeared in the invention or improvement of ſeveral mechanical arts, and amongſt others they lay claim to the honour of having invented the curious and uſeful art of Printing. This art is ſaid to be of very ancient ſtanding in China, but then their manner of printing is quite different from that which obtains in Europe; though it muſt be owned the European printing, in its infancy, was much the ſame with the Chineſe. However, as there was then no correſpondence between Europe and China, the paſſage into the Eaſt by the Cape of Good Hope, being undiſcovered, there is no reaſon to charge the Europeans with having borrowed their art from the Chineſe, but each may be allowed to have fallen upon the ſame invention, though at very different times.

PRINTING, according to Father Le Comte, has been known in China from almoſt all ages; but the great difference between theirs and ours is this, that whereas we have but a ſmall number of letters in our alphabets, by the various arrangement whereof we can form infinite volumes, ſo by making our characters moveable, we are able to print the largeſt works with an inconſiderable quantity of letter, the ſame which ſerved for the firſt ſheets ſerving alſo for the ſucceeding ones, by being ſeparated and placed in a different order. The Chineſe, on the contrary, by reaſon of the prodigious number of their letters*, find it more eaſy and leſs expenſive to cut them on wooden blocks, making as many blocks as there are pages in the book they intend to print, and theſe of no farther uſe but for that ſingle work.

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* The art of joining letters to form words, and of combining the one and the other an infinite number of different ways, is a ſecret unknown to the Chineſe. At firſt, like the Egyptians, they uſed hieroglyphics, and painted rather than wrote, ſtriving by the natural images of things, as a bird, a tree, &c. to expreſs and communicate their ideas to one another. But this manner of writing was not only very incommodious, but imperfect, as they could but expreſs their thoughts by halves, and what they did expreſs was frequently liable to be miſunderſtood; not to mention the room theſe pictures took up, which obliged them to write a great deal to ſay very little matters. To remedy theſe inconveniencies, they changed their way of writing by degrees, and even invented ſeveral characters to expreſs things that did not come within the reach of painting to repreſent, as the paſſions, thoughts, voice, taſte, and a thouſand other objects without body or figure. From ſimple ſtrokes, they framed others more compound, and contriving one or more character for every word, they multiplied their letters almoſt to infinity. This ſeems to be the ſource of that ignorance we find among the Chineſe, ſo great a part of their lives being ſpent in learning their letters, that they have not time to apply themſelves to the ſtudy of things, but think themſelves learned if they are able to read. Nay, we are told, that ſcarce any of them know all their letters; and father Le Comte is of opinion, the greateſt doctor amongſt them never underſtood half their letters perfectly, for he reckons the whole number to be eighty thouſand.—This is a prodigious inconvenience to foreigners, and much complained of by the miſſionaries in that country.

WHO was the firſt inventor of printing in Europe, in what city and what year it was firſt ſet on foot, is a queſtion long diſputed among the learned, and not yet thoroughly decided. The cities of Mentz and Straſbourg, and that of Haerlem in Holland are the warmeſt in this point of honour, but Mentz has always had the majority of Voices; and as this is a city of Germany, we think it proper here to propoſe the pretenſions of each, without entring into a nice diſquiſition of the merits of the cauſe.—John Mantel of Straſbourg, John Guttemberg, and John Fuſt of Mentz, and Laurence John Koſter of Haerlem, are the perſons to whom this invention has been moſt frequently aſcribed, but the firſt ſeems to have had the feweſt advocates. Mantel however, a French phyſician, enters the liſts in behalf of his nameſake, and contends that he firſt invented printing in the year 1442, in conſideration whereof the emperor Frederic III. gave him a ſuitable coat of arms; and he adds, that Guttemberg, whom he made his aſſociate, carried the art to Mentz, where he had took in Fuſt as a partner.—Boxbornius, Schrevelius, and other authors refer the invention to Koſter of Haerlem in the year 1430, adding, that Fuſt ſtole away Koſter's materials, and ſet up printing at Mentz, aſſiſted by his ſervant Peter Schoeffer, who afterwards married his daughter, and became his partner in the buſineſs; but others aſcribe this theft to Guttemberg.—Polydore Virgil, Paſquier, &c. will have Guttemberg to be the inventor of printing; but Naude eſpouſes the cauſe of Fuſt, whom he makes the firſt printer in Europe. His reaſon for aſcribing the invention to Fuſt is, that his name appears in the moſt early printed books, as in the Latin Bible of 1462, Tully's Offices of

1465, and perhaps ſome of a prior date; and if Guttemberg or Koſter had a greater or an equal ſhare in the invention, it is more than probable they would not have allowed him to attribute the whole to himſelf and his ſon-in-law Schoeffer, as he has done, without contradicting him, and aſſerting their own right. He adds, that whatever is urged in behalf of Guttemberg, Mantel, or Koſter, is only founded on reports, conjectures, and forged authorities.

BUT the diſpute is not thus terminated: the advocates for Koſter make uſe of various arguments in his favour. Mr. Ellis (in the Philoſophical Tranſactions) gives an account of books printed by Koſter of an earliar date than any of thoſe referred to Fuſt, and ſome even as early as 1430 and 1432. At Haerlem, it is certain, they ſhew printed books of that date, which ſeem to Mr. Ellis to put it out of doubt, that the honour of the invention belongs to Koſter, and that Fuſt only eſtabliſhed the art in greater perfection at another place many years after. Beſides, it is allowed on all hands, that the DE SPIEGEL ONSER BEHOEDINGE (or Mirror of our Salvation) which is ſhewn at Haerlem for the firſt printed book, could never be Koſter's firſt eſſay. He muſt have made many trials on leſſer works, and undoubtedly his firſt attempts were on looſe and ſmall leaves. which we may ſuppoſe were eaſily loſt. Upon the whole, it is no inconſiderable argument in Koſter's behalf, that the rudeſt and moſt artleſs performances in printing ſeem to be his; of which kind ſome things without date, are to be ſeen in the king's library at St. James's, and in the Bodleian at Oxford. They have the marks of the utmoſt ſimplicity, and may be reaſonably taken for firſt eſſays, being awkward and coarſe, and the ink only common writing ink, which was unartfully ſpread upon wooden blocks, cut in a very clumſy manner.

WHOEVER therefore were the firſt printers, or whenceſoever the hint was taken, ſuch was the art in its original ſtate, ſeveral pieces in the Bodleian library, and that of Bennet's college being printed in this way; and the impreſſion appears to have been made only on one ſide of the leaves, after which the two blank ſides were paſted together. But this method of printing upon wooden cuts being found inconvenient, it was not long before an improvement was thought of, viz. the making of ſingle moveable letters, which was firſt done in wood, and afterwards in metal; from which laſt invention we ought to date the origin of the preſent art of printing, as practiſed throughout Europe. This ingenious contrivance of caſting ſingle types in metal is generally aſcribed to the above-mentioned Schoeffer, firſt ſervant, afterwards partner and ſon-in-law of Fuſt at Mentz in Germany; ſo that he was properly the firſt printer, as well as letter-founder; and, ſtrictly ſpeaking, the Bible, printed with moveable types in 1450, or thereabouts, was the firſt printed book *, which was ſoon followed by editions of Auguſtin De Civitate Dei, the Vocabulary called Catholicon, Tully's Offices, and ſeveral other works.

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* It is ſaid that Fuſt (or Fauſtus, as ſome authors call him) carried a parcel of his printed Bibles to Paris, and offered them to ſale as manuſcripts; but the French, conſidering the number of the books, and their exact conformity to each other, even to a point, and that the beſt book-writers could not come up to ſuch exactneſs, concluded there was witchcraft in the caſe, and by indicting him as a magician, or threatening to do ſo, obliged him to diſcover the ſecret. Hence the origin of the popular ſtory of Dr. Fauſtus.

FROM Mentz the art of printing ſpread itſelf in a ſhort time through great part of Europe, and is commonly ſaid to have been brought into England from Haerlem in 1468, by William Caxton, a merchant and citizen of London, who having been abroad in the Low Countries for many years, not only got an inſight into the buſineſs, but prevailed with one of the workmen to come over and ſet up a preſs at Oxford, where an edition of Ruffinus on the Creed was printed in the ſame year. In 1470 Caxton is thought by ſome to have brought the art to Weſtminſter; but a modern antiquary ſeems to have made it appear, that he did not bring it to England till about the year 1474, and that the firſt book known to have been printed in Engliſh, and by him, was the Hiſtory of Troy.

HERE we cannot forbear obſerving, that tho' we allow the Germans the honour of having caſt the firſt moveable letters in metal, and of being the firſt printers, the praiſe of having brought thoſe arts to their preſent perfection is chiefly owing to other nations. The Dutch, French, and Engliſh, have all of them contributed towards it; and in particular our countryman Mr. William Caſlon, has of late years, by mere dint of genius, without being bred up to the art of letter-founding, arrived at an excellency in it far beyond all his predeceſſors in England, and even ſurpaſſing what is uſually done of that kind in Holland, as the beautiful ſpecimens of his own and his ſon's performances (not unknown to the curious) ſufficiently demonſtrate. By his ingenuity and unwearied application in this way, we may ſafely affirm, (without being thought guilty of flattery or partiality) that he has done ſervice to his country and to the learned world in general, and his reputation deſerves to laſt as long as the art of printing can preſerve it.

THE matter of which the printing-letters conſiſt is a compound metal, made up of lead, tin, antimony, &c. mixed in a certain proportion according to the diſcretion and experience of the founder. Each letter or character has its proper matrice, (as they call it) which is a piece of copper, whereon the impreſſion of ſuch character has been ſtruck by means of a ſteel punchion, on one end of which it is graven in relievo. In order to caſt the letter, the matrice is placed at the end of an iron mould, incloſed within two thin pieces of board, and conſiſting of ſeveral parts, which have different names according to their different uſes. Every thing belonging to the mould being properly diſpoſed, and the metal melted over the furnace, the workman takes the mould in his left hand, and dips a little iron ladle with a wooden handle into the metal, which he pours into the jet or funnel of the mould, whereby it is conveyed to the matrice; at the ſame time moving his left hand briſkly forwards, that the metal may run the better. This done, he unbends the bow, (which is a thick ſteel wire, ſerving by its ſpring to preſs and retain the matrice in its place) and having opened the mould, he takes out the letter by means of a little hook, ſhuts it again immediately, replaces the matrice, and caſts a new letter: and thus he proceeds with a ſurprizing expedition till he has caſt the number required. The letters are now examined, and thoſe that are defective thrown aſide; the jets or tails are broken off, and the ſuperfluous metal, occaſioned by the mould's not being exactly cloſed, is cleared away with a knife. After this the two broad ſides of the letters are rubbed on a hard coarſe grained ſtone, the perſon rubbing them having his two fingers next the thumb covered with a kind of finger-ſtalls made of leather, to prevent their being hurt by the friction; and in turning the letters he makes uſe of his thumb ſo nimbly, without diſcontinuing the motion, that a by-ſtander might be eaſily deceived, and think they had all the while been rubbed on one ſide only. The letters thus ground remain ſtill to be juſtified, i. e. reduced to an exact height and thickneſs; for which purpoſe they are placed on a ſort of wooden ruler with a little ledge at the bottom, and the narrow ſides are ſcraped, which underwent no rubbing on the ſtone. To make them of an equal height, they are ranged upſide down in an inſtrument, conſiſting of two long pieces joined together by ſcrews, which being fixed very faſt between two cheeks of wood, a plane is run along the bottom of the letters thus inverted, wherein a ſmall groove is formed, and being now compleatly dreſſed and adjuſted, they are fit for the printer's uſe.

AFTER this ſhort view of the letter-founder's art, the reader may naturally expect ſome acount of the method of printing. The letters then, being caſt and finiſhed as above deſcribed, are diſtributed, each kind by itſelf, into wooden caſes, (as they are called) which are divided into a proper number of little cells or boxes of different ſizes. Theſe caſes are placed on a frame ſomewhat ſloping, in the manner of a reading-deſk, that the workman may reach the upper boxes the better, and be in leſs danger of mixing the letters by ſtretching his arm over them. The compoſitor, having a leaf of the work to be printed lying before him, ſtands againſt the middle of the caſe, holding in one hand an iron inſtrument called a Compoſing-Stick, and with the other he takes the letters, figures, points, &c. out of the boxes as he needs them, ranges them in the compoſing-ſtick on a ſlip of braſs called a Rule, and putting ſpaces between the words, he forms one line after another till the ſtick is full. He then empties the lines into a wooden inſtrument called a Galley, fills his ſtick again, empties as before, and ſo on till he has finiſhed a page; which he ties round with a ſmall packthread, ſets it by, compoſes another, and thus proceeds, till the number of pages to be printed on one ſheet be compleated. This done, he carries them to a ſmooth hard ſtone, placed horizontally like a table, on which he ranges them in due order and diſtance, puts round them a ſet of Furniture, conſiſting of pieces of wood of different dimenſions, unties them, and at laſt faſtens or locks them up in an iron frame called a Chaſe, ſo that the whole may be lifted up from the ſtone, as if it were one ſolid piece of metal. In this ſtate the pages, whether two, four, eight, twelve, or whatever number is to be printed on one ſide of the ſheet, are called a Form; and the correſponding pages, to be printed on the other ſide, are fixed in another chaſe, in the ſame manner and at the ſame diſtance, ſo as to fall exactly on the back of each other. The two forms being thus impoſed, (as they term it) one ſheet is printed, which is carefully read over, and the faults occaſioned by the compoſitor's inattention, or the caſual miſplacing of the letters in the boxes, are marked in the margin. In order to correct theſe miſtakes, the compoſitor lays the forms upon the ſtone, unlocks them, and with a ſharp bodkin picks out the wrong letters, puts others in their room, and makes all other neceſſary alterations. After this the ſheet generally undergoes a ſecond reading and correction, and is then committed to the preſs.

THE printing-preſs is a very complex machine, of which it is not eaſy to form an idea by a bare deſcription. Its two principal parts, each whereof is compoſed of ſeveral others, are the Body and the Carriage. The body conſiſts of two ſtrong Cheeks placed perpendicularly, joined together at top by a croſs piece of wood called the Cap. A little below is another piece called the Head, which is moveable, being ſuſtained by two iron pins or long Bolts that paſs thro' the Cap; and in the head is fixed a braſs Nut, having a female ſcrew or worm, which receives the male ſcrew of the Spindle. Through an eye or hole made in the ſpindle is rivetted an iron bar, by which the preſs is wrought; and the lower part, which is tapering and pointed with ſteel, is incloſed in a ſquare wooden frame called the Hoſe, having two croſs planks called Shelves to keep it ſteady. The point of the ſpindle works in a plug fixed in a braſs pan ſupplied with oil; and this pan is fixed to an iron plate let into the top of the Platten, which is a ſquare ſmooth piece of wood, hanging horizontally, whereby the impreſſion is made. Underneath all lies another piece called the Winter, which bears the carriage, and ſuſtains the effort of the preſs below, as the head does above, each giving way a little, the one upwards, the other downwards, to make the pull the eaſier.—On the carriage are nailed two long iron bars or Ribs, faced with ſteel; and to the plank, ſuſtained by the carriage, are nailed ſhort pieces called Cramp-Irons, equally tempered with the ribs, on which they ſlide when the preſs is turned in or out. Upon the plank is a ſquare frame or Coffin, containing a hard poliſhed ſtone for the form to lie on; and underneath the carriage is fixed a ſmall piece of iron called the Spit, with a double wheel in the middle, round which run leather Girts, that are nailed to each end of the plank: and by the means of a handle or Rounce at the hither end of the ſpit, the preſſman turns the plank in and out at pleaſure. Oppoſite to the body of the preſs are the Tympans, being two ſkins of parchment paſted on wooden frames, one ſo ſmall as to lie within the other. The largeſt or outward tympan is faſtened to the coffin by iron joints, and between both are placed blankets, which ſoften the impreſſion of the platten on the ſurface of the letters, and render it more equable. To the top of this outward tympan is fixed by joints a thin frame of iron called a Friſket, which is alſo covered with paper or parchment, ſo far as is neceſſary to keep the margin of the ſheet clean, and no farther.—In working at preſs two men are generally employed, one of whom applies the ink upon the form, by beating it over with two balls ſtuffed with wool, and nailed to a kind of wooden tunnels called Ball-ſtocks; and the other lays the ſheet on the outer tympan, turns down the friſket and tympan on the form, which he runs in under the platten, by means of the ſpit-handle above-mentioned, gives two pulls with the bar to make the impreſſion, and then turning the ſame handle the contrary way he brings back the form, lifts up the tympan and friſket, and takes off the printed ſheet. The form is then beat over again with the ink-balls, another ſheet laid upon the tympan, and printed in the ſame manner as before; and ſo the workmen proceed till they have wrought off the number of ſheets required. This form being then taken off the preſs, the correſponding one is laid

laid on, and the ſheets printed on the other ſide, which renders them compleat. To get the ink off the forms, they are waſhed with a ſtrong lye; and then the compoſitor, as he finds occaſion, diſtributes the pages, i. e. replaces the letters in their proper boxes, to be uſed again in the ſucceeding ſheets.—All this is performed, both on the part of the compoſitor and the preſs-man, with a degree of expedition and addreſs not eaſy to be imagined.

THE invention of the Rolling-Preſs, for taking off prints from copper-plates engraven or etched, is commonly aſcribed to Lipſius; but it appears to be earlier than his time, (as Mr. Ellis obſerves) from a printed miſſal in the Bodleian library, dated 1481, where there is a print of the arms of the ſee of Wurtzburg in Germany, and thoſe of the biſhop, evidently taken off by the rolling-preſs, as the impreſſion of the plate and other circumſtances leave no room to doubt. The diſcovery of the art of Engraving is indeed ſaid to be as ancient as the year 1460, and aſcribed to Finiguerra, a goldſmith of Florence; however, nothing conſiderable was done in that way till ſome years afterwards by Martin of Antwerp, and then by Albert Durer and Lucas, who ſucceeded in it to admiration. About the ſame time the method of Etching was diſcovered, that is, of eating the ſtrokes or lines in the copper with Aqua fortis, inſtead of cutting them with a tool or graver.—As to the ſtructure of the rolling-preſs, it is much more ſimple than that of the printing-preſs above deſcribed; and we need only inform the reader, that the impreſſion is made by paſſing the plate, covered with the paper and blankets, between two wooden cylinders or rollers, whence the machine has its name.

As the origin of printing is generally referred to the Germans, an art calculated for the promotion of knowledge and the general good of mankind, ſo are they likewiſe ſuppoſed to be the authors of thoſe deſtructive and murdering inventions of Guns and Gunpowder. The diſcovery indeed, like many others, ſeems to have been caſual, and, according to Polydore Virgil, the name of the inventor is not known. Thevet ſays the perſon was a monk of Friburg, whoſe name was Anelzen; but other authors, with more probability, aſcribe it to Barholdus Schwartz, a friar, who in making chymical experiments, mixed ſome ſaltpetre and brimſtone with other ingredients, and ſet them upon the fire in a crucible, into which a ſpark happening to get, the pot ſuddenly burſt with great noiſe and violence *. This unexpected effect ſurprized him at firſt; but repeating the experiment, and finding it conſtant, he ſet himſelf to work to improve it; to which purpoſe he cauſed an iron tube to be made, with a ſmall hole at one end; and putting in ſome of his new compoſition, together with ſome little ſtones, he ſet fire to it, and found it anſwer his expectations, by penetrating all before it. This Schwarts (ſay they) taught the uſe of Gunpowder to the Venetians, who firſt employed it in their war with the Genoeſe in 1380: but the invention is undoubtedly of an earlier date, for we read that when Alphonſus, king of Caſtile, beſieged the Moors in 1343, they diſcharged a ſort of iron mortars which made a

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* Polydore Virgil relates the ſtory ſomewhat differently, viz. that the ingredients were put into a mortar covered with a ſtone, and the man ſtriking fire near it with flint and ſteel, a ſpark accidentally flew in, whereby the compoſition was inflamed, and the ſtone blown up from the mortar.

noiſe like thunder: and this is confirmed by what Don Pedro, biſhop of Leon, relates in his Chronicle of king Alphonſus, who reduced Toledo, namely, that in a ſea-fight between the king of Tunis and the Mooriſh king of Seville about that time, the Tuniſians made uſe of iron tuns or barrels, from whence they threw thunderbolts of fire. Add to this what Du Cange tells us, that the regiſters of the chamber of accounts in France make mention of gunpowder as early as the year 1338. But after all, there is ſufficient reaſon to think, that our celebrated Friar Bacon underſtood the compoſition of gunpowder long before Schwartz was born, or any mention is made of its being uſed in war, as we have already obſerved towards the beginning of this work.

GUNPOWDER is a compoſition of ſalt-petre, ſulphur, and charcoal, mixed together and formed into little grains, which eaſily takes fire, and is rarefied or expanded with ſurprizing vehemence *. Writers vary with reſpect to the proportions

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* The effect of gunpowder is not very difficult to be accounted for, if we conſider that the charcoal it contains takes fire like tinder, whereby the ſulphur and ſalt-petre break into flame, and the latter expands itſelf to a prodigious degree, even ſo as to take up (according to computation) above ten thouſand times the ſpace it poſſeſſed before.—Sir Iſaac Newton thus explains the matter: the charcoal and ſulphur eaſily take fire, and kindle the nitre; and the ſpirit of the nitre being thereby rarefied into vapour, ruſhes out with an exploſion, much like the vapour of water out of an Æolipile. The ſulphur alſo, being volatile, is converted into vapour, the acidity whereof cauſes the greater fermentation, by which the heat is augmented, and the exploſion rendered more quick and vehement. The exploſion of gunpowder, therefore, ariſes from the violent action, whereby the whole mix-

portions of the three ingredients, but as to the proceſs there is little difference. All the ingredients are firſt finely powdered, then moiſtened with fair water, ſpirit of wine, vinegar, urine or the like, and pounded together in a mortar for twenty-four hours at leaſt; care being taken to wet the maſs from time to time, to prevent its taking fire. It is then formed into balls as big as eggs, which are put into a ſieve, with a bottom of thick parchment made full of round holes; and by means of a wooden ball rolled about the ſieve along with them, they are broken in pieces, and forced through the little holes in grains or globules, which being dried the powder is compleat. —To make large quantities mills have been invented, whereby more work is done in one day, than a man can do in a hundred.

THE invention of this deſtructive powder was naturally followed by that of guns, cannons, mortars, and other inſtruments uſed in the modern art of war. The firſt cannons were called Bombardæ, (from Bombus) by reaſon of their noiſe; and our word Bomb had undoubtedly the ſame derivation. Theſe military engines ſeem to have had their origin before the middle of the fourteenth century; for (beſides the teſtimonies already mentioned) hiſtorians inform us, that at the battle of Creſſy, in 1346, there were five or ſix pieces of

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mixture being ſuddenly and greatly heated is rarefied into fume and vapour; which vapour, becoming ſo hot as to ſhine, appears in the form of flame.—M. de la Hire aſcribes all the force and effect of gunpowder to the ſpring or elaſticity of the air incloſed in the ſeveral grains, and in the intervals or ſpaces between them. According to him, the powder being kindled, gives motion to the ſprings of the numerous little particles of air; which is all the fire ſerves to do, the whole effect afterwards being produced by the air alone.

cannon in the Engliſh army, with which Mezeray ſays the French were intimidated, being the firſt time they had ſeen ſuch thundering machines. As to the invention of bombs *, neither the time nor the author is exactly known; for according to M. Blondel, the firſt bombs were thoſe thrown by count Mansfeld into the town of Wachtendonck in Guelderland in 1588, though others ſay they were uſed almoſt a century before, viz. at the ſiege of Naples by Charles III. in 1495. They began to be uſed in France in 1634, and ſince that time they have been commonly employed in ſieges.

THERE is a very uſeful invention which ſome aſcribe to the Germans, viz. that of clocks, ſuch as are now in uſe amongſt us; at leaſt they may be allowed to have retrieved the art, and to have excelled all the world in the contrivance of variety of motions, not only to ſhew the courſe of the hours and minutes, but even of the ſun,

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* A bomb is a hollow iron-ball or ſhell, filled with gunpowder, and thrown out of a ſhort piece of ordnance called a Mortar. There is a vent or aperture left in the ſhell, into which a fuſee or wooden tube is driven, and faſtened with a ſtrong cement. This fuſee is filled with a combuſtible matter, made of two ounces of nitre, one of ſulphur, and three of gunpowder duſt, well rammed; and this being ſet on fire burns ſlowly till it reaches the gunpowder in the ſhell, which goes off at once, burſting it to pieces with incredible violence. Great care is to be taken, that the fuſee be ſo proportioned, as not to ſet fire to the powder before the ſhell arrive at the place where it is deſigned to fall, otherwiſe it burſts in the air without doing the intended execution.—Maltus, an Engliſh engineer, is ſaid to have firſt taught any regular uſe of mortars, in the year 1634; but he knew nothing of the curve the ſhot deſcribes in its paſſage, nor of the difference of range at different elevations: and yet there are certain rules, founded on geometry, for theſe things; moſt of which we owe to Galileo and his diſciple Torricelli.

moon, and ſtars; of which the clocks at Straſburgh, Prague, and many other places in Germany, are ſufficient inſtances. The Emperor Charles V. had a watch in the jewel of his ring, and in the elector of Saxony's ſtable may be ſeen a clock in the pommel of his ſaddle.

THE neceſſity there is of meaſuring time has given riſe to many inventions for that purpoſe, whereof that of ſun-dials is of great antiquity; witneſs the dial of Ahaz, who began his reign 400 years before Alexander: but the art of dialling was not brought to its utmoſt perfection till the late diſcoveries in optics and aſtronomy. The uſe of the Clepſydra is alſo very antient *, which was a contrivance to meaſure time by the fall of a certain quantity of water; as we ſtill do by the running of ſand out of one part of an hour-glaſs into the other. The invention of clocks with wheels, ſprings, &c. is of a more modern date, being referred to Pacificus, Archdeacon of Verona, who lived in the ninth century; though others aſcribe it to Boethius, about the year 510 †.

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* This ſort of chronometer was invented in Egypt under the Ptolemies, which the Egyptians made uſe of to meaſure the courſe of the ſun, as Tycho Brahe did in our days to meaſure the motion of the ſtars; and Duley uſed the ſame contrivance in making his obſervations at ſea.—As ſun-dials were of ſervice chiefly in the ſummer, ſo were the Clepſydræ in the winter: but they had two defects; the one, that the water ran out with more or leſs facility, as the air was more or leſs denſe: and the other, that it ran faſter when the veſſel was full, than when it was almoſt empty. M. Amontons, however, has invented a Clepſydra free from both theſe inconveniencies.

† Dr. Derham makes clock-work of a much older ſtanding, reckoning Archimedes's ſphere, and that of Poſidonius, among the machines of this kind; not that their form

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Be this as it will, we are certain that the invention of the pendulum-clock, whereby the meaſure of time is reduced to the greateſt exactneſs poſſible, is owing to the happy induſtry of the laſt age, the honour of it being diſputed between Huygens and Galileo. The former, who publiſhed a treatiſe on the ſubject, declares that he firſt put it in practice in the year 1657; but Becher ſtickles for Galileo, by whoſe direction he ſays the firſt pendulum-clock was made at Florence, and a pattern thereof brought into Holland. This however is certain, that the invention never flouriſhed till it came into the hands of Huygens, who inſiſts upon it, that if Galileo ever thought of ſuch a thing, he never brought it to any degree of perfection.—The firſt clock of this kind, made in England, was about the year 1662, by M. Fromantil, a Dutchman.

THE invention of Spring or Pocket-Watches was likewiſe about the middle of the laſt century, and the honour of it lies between Dr. Hooke and M. Huygens, the Engliſh aſcribing it to the former, and foreigners to the latter. Dr. Derham is a ſtrenuous advocate for Dr. Hooke, and tells us, that he contrived various ways of regulating watches, of which one was a loadſtone.

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or uſe were the ſame with our clocks, but as having their motion from ſome hidden weights or ſprings, with wheels, pullies, or ſome ſuch clock-work principle.—Among the curious inventions of the ancients in this way, the doctor alſo takes notice of Archytas's dove, which, according to Aulus Gellius, was made of wood, and ſo contrived as to fly about. To this he adds Regiomontanus's wooden eagle, which flew out of the city, met the emperor coming towards it, and having ſaluted him turned back again, waiting on him to the city-gates: alſo his iron fly, which at a feaſt flew from his hand, and having taken a round returned thither again.

Another was by a ſlender ſtrait ſpring, one end whereof played backwards and forwards with the balance, ſo that the balance was to the ſpring as the bob to a pendulum, and the ſpring as the rod thereof. A third method was by two balances, ſome of which were made with a ſpiral ſpring for a regulator, and others without. One of theſe watches, with a double balance was made by Mr. Tompion in 1675, and preſented to King Charles the Second; and the invention quickly getting into repute, both at home and abroad, two of them were ſent for by the Dauphin of France. Soon after this, M. Huygens's watch with a ſpiral ſpring appeared in England, and great matters were expected from it, as if it would ſerve to diſcover the longitude. This watch agreed with Dr. Hooke's in the application of the ſpring to the balance, but the pulſes of M. Huygens's were much ſlower, and the balance, inſtead of turning once round, as Dr. Hooke's turned ſeveral times every vibration. Huygens invented ſeveral other kinds of watches, ſome without any ſtring or chain, to which in particular he gave the name of Pendulum Watches.

REPEATING clocks and watches (i. e. ſuch as by pulling a ſtring, or other means, repeat the hour and quarters at any time of the day or night) are undeniably the invention of Mr. Barlow, who firſt put the contrivance in practice in larger movements, or clocks, about the year 1676; in which he was ſoon followed by other artiſts: but the application of it to pocket-watches was not known till the reign of King James the ſecond, when Mr. Barlow ſolicited a patent to ſecure his invention. The talk of this engaged Mr. Quare to put in execution a like contrivance, which he had thoughts of ſome years before;

and as he endeavoured to prevent Mr. Barlow's obtaining a patent, a watch of each kind was ſhewn before the king and council, and upon trial the preference was given to Mr. Quare's.—Upon the whole we may obſerve, (without derogating from the honour due to the French, Germans, or any other nation) that as watches had their firſt riſe in England, ſo there they have arrived at their greateſt perfection; witneſs the exceeding value put on an Engliſh watch in all foreign countries *.

AMONGST the inventions of the Germans, we ought to take notice of that noble inſtrument the Air-Pump, to which the preſent age is indebted for ſo many fine diſcoveries, and which is aſcribed to Otho de Guerick, a conſul or burgomaſter of Magdebourg, who exhibited his firſt experiments therewith before the emperor and the ſtates of Germany at Ratiſbon, in the year 1654. It is true, ſome have aſcribed the invention to the honourable Mr. Boyle, and the engine has obtained the name of Machina Boyleana; but this is rather on account of the improvements made in it, or the various experiments it was applied to, by that great philoſopher: for though he had actually made ſome attempts of this nature before he knew any thing of what was done in Germany, yet he ingenuouſly confeſſes de Guerick to have been beforehand with him, and that it

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* Notwithſtanding what M. Savary (in his Dictionaire de Commerce) ſays in favour of the French watch-makers, it is certain, that moſt people in France prefer our watches to their own; and in order to have them with more eaſe, a number of Engliſh workmen were invited over in 1719, and ſettled at Verſailles, under the direction of the famous Mr. Law: but the men growing diſſolute, quarrelling with the clergy, and inſulting the magiſtrates, they were diſmiſſed of neceſſity, and the eſtabliſhment fell to the ground.

it was the information he afterwards received from a book publiſhed by Schottus, containing an account of de Guerick's experiments, which enabled him to bring his deſign to maturity. This machine has been of late years much improved by the ingenious Mr. Hawkſbee and others, and ſeems now to be carried to its utmoſt perfection.

THE uſe and effect of the air-pump is to exhauſt the air out of any proper veſſel, and thereby make what is popularly called a Vacuum, which in reality is only ſuch a degree of rarefaction, as is ſufficient to ſuſpend the ordinary effects of the atmoſphere *. Hence therefore we learn, in ſome meaſure, what our earth would be without the maſs of air which ſurrounds it, and how neceſſary it is to the life, generation, and nutrition, both of animals † and vegetables, and to various

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* The rarefaction or dilatation of the air by its own elaſticity, without the help of any heat, is found to be very ſurprizing. In ſeveral experiments made by Mr. Boyle, it dilated firſt into 9 times its former ſpace, then into 31 times, then into 60, and then into 150. At length, by many degrees, he brought it to dilate into 8000 times, then into 10000, and laſt into 13679: and yet we know not how much farther it is capable of being expanded. Hence it appears, that the air we breathe, near the ſurface of the earth, is compreſſed by its own weight into at leaſt the 13679th part of the ſpace it would poſſeſs if it were at liberty. But if this air be condenſed or compreſſed by art, the ſpace it takes up when moſt dilated, is to that it poſſeſſes when moſt condenſed as 550000 to 1, according to the ſame author's experiments.

† Even the inhabitants of the waters need air as well as thoſe of the land, tho' not in the ſame quantity; for it is known that fiſhes uſe reſpiration, by paſſing the water thro' their gills, which to them do the office of lungs in other animals.—It is remarkable that ſome fiſhes, as eels, will live a long time out of the water; and we are aſſured, that in Holland they have a way of fattening carp, by hanging them up in

various other purpoſes, in which we are apt to think it is not at all concerned.—The principle on which this machine is founded is the elaſticity or ſpring of the air; and the baſis or eſſential part of it is a metalline tube, anſwering to the barrel of a common pump or ſyringe, having a valve at the bottom opening upwards, and a moveable piſton or embolus, anſwering to the ſucker of a pump, furniſhed likewiſe with a valve opening upwards; the whole properly fitted to a veſſel as a receiver, from whence the air is to be exhauſted. The other parts of it, chiefly reſpecting conveniency, have been diverſified and improved from time to time; and particularly Mr. Hawkſbee, by adding a ſecond barrel and piſton to the former, to riſe as the other falls, and fall as it riſes, has made the working of the engine much eaſier than it was before. To this gentleman we are indebted for the ſtructure of the air-pump now in common uſe; but Mr. Martin has lately contrived one of a different form, which he calls a Portable Air-Pump, being ſo conſtructed that it may, together with its receivers, be contained in a box of a ſmall ſize, and ſold at a ſmall price in compariſon of thoſe before invented.

THE reader muſt obſerve, as we have already hinted, that an abſolute Vacuum cannot be obtained by the air-pump, i. e. all the air cannot be exhauſted out of the receiver, be the pump ever ſo good, or worked ever ſo long; for as the air which is drawn out is only expelled by the ſpring of that which remains behind, if we ſup-

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in a cellar or other cool place, in a net full of wet moſs, with their heads out, and feeding them with white bread and milk for many days; which method has alſo been practiſed in England.

poſe every particle to be exhauſted, the laſt muſt be expelled without an agent, or there would be an effect without a cauſe, the abſurdity whereof is evident. However, the air is dilated by this machine to ſuch a degree, that bodies placed in an exhauſted receiver are uſually ſaid to be *in vacuo*; and by this means a vaſt number of curious experiments have been made, which have given great light into the ſecrets of nature, and of which, if we mention a few of the moſt remarkable, it perhaps will be an agreeable entertainment to thoſe who are unacquainted with ſuch phænomena.

FIRST then, to demonſtrate the ſpring of the air, if a bottle whoſe mouth is ſecurely ſealed, ſo that no air can eſcape from within, be placed under a receiver, and the air exhauſted from the ſurface of the bottle, the ſpring of the included air will burſt it to pieces. 2. If a bladder be almoſt emptied of air, and tied very tight, the air within will expand itſelf *in vacuo*, ſo as to make the bladder appear full-blown. 3. By making a little hole in the ſmall end of a new-laid egg, and exhauſting the receiver, the bubble of air contained between the ſhell and ſkin at the great end will expand itſelf, ſo as to force the white and yolk of the egg through the hole; and if half the ſhell of the egg thus emptied be taken of, the ſaid bubble will raiſe up the ſkin, ſo as to reſemble an entire egg. 4. A ſhrivelled apple will become ſmooth and plump under the exhauſted receiver, by the expanſion of the air contained in its ſubſtance. 5. Fiſhes are made ſo light by increaſing the ſpring of the air in their bladders, upon exhauſting the receiver, that they riſe to the top of the water, and cannot again deſcend to the bottom *.

tom*. 6. Water heated as hot as the finger can well bear it, will boil vehemently under the exhauſted receiver; but upon letting the air in again the agitation ceaſes. 7. Freſh ſmall beer placed *in vacuo* riſes up in froth, dies, and loſes all it taſte. 8. Vegetable ſubſtances put in water under the receiver emit great quanties of air from all parts of their ſurface. 9. The weight or preſſure of the air is ſhewn by exhauſting two hollow braſs hemiſpheres, which are then compreſſed together by the external air, ſo as to require a force to pull them aſunder equal to 188 pounds, if the diameter of the hemiſpheres be four inches. 10. A perſon placing his hand on the top of an open receiver,

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* It is a rule in hydroſtatics, that a body heavier than ſo much water as is equal to it in bulk will neceſſarily ſink, that a lighter will ſwim, and that a body of equal weight will reſt in any part of the water. Now, by this rule, if a fiſh in the middle region of the water be of equal weight with the element, bulk for bulk, the fiſh will remain there without any natural tendency upwards or downwards; and if the fiſh be deeper in the water, its bulk becoming leſs by the compreſſion of the bladder, and yet retaining the ſame weight, it will ſink and reſt at the bottom. On the other hand, if the fiſh be higher than the middle of the water, the air of the bladder dilating itſelf, and the bulk of the fiſh conſequently increaſing, but not its weight, it will riſe upwards, and reſt at the top of the water.—Probably the fiſh, by ſome action or other, can emit air out of its bladder, or take it in, as there is occaſion; for Mr. Ray obſerves, that in moſt fiſhes there is a manifeſt channel from the gullet to the bladder, which doubtleſs ſerves for the conveyance of air; and there is a muſculous power in the coat of the bladder, whereby the fiſh can contract it when it pleaſes.—In confirmation of what has been ſaid with reſpect to the uſe of the ſwimming bladder in fiſhes, the ſame gentleman adds, that if the bladder happen to be pricked or broken, the fiſh cannot raiſe or ſupport itſelf, but immediately ſinks to the bottom; and that ſoles, plaice, and other flat fiſhes, which always lie grovelling at the bottom, have no ſuch bladder that ever he could diſcern.

ceiver, will very ſenſibly feel the preſſure of the air on the back of his hand, in proportion as the receiver is exhauſted; and the ſpring of the air contained in the fleſh exerting itſelf at the ſame time, the inſide of his hand ſwells downwards into the receiver *. 11. If the air be exhauſted from a thin bottle placed under a receiver, and then ſuddenly let in again, its weight will inſtantly reduce the bottle to very ſmall pieces. 12. If a piece of wood be cemented in the lower part of the neck of an open receiver, and mercury poured upon it, after two or thee exhauſtions the

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* The vaſt weight or preſſure of the air, which indeed we do not feel, but are made fully ſenſible of by philoſophical experiments, is a matter that muſt lead us to admire the infinite wiſdom of the great author of nature. It is computed, that twenty-nine inches and a half is the mean altitude to which the mercury riſes in the barometer by the preſſure of the air, and conſequently its weight is taken for the mean weight of a column of air of the ſame baſe, and as high as the atmoſphere. Now a column of mercury, whoſe baſe is one ſquare inch, and height $29\frac{1}{2}$, weighs about 15 pounds, which is therefore equal to the preſſure of the air on every ſquare inch, and then upon every ſquare foot it will be 2160 pounds. In this proportion the air preſſes upon all bodies on the ſurface of the earth; and therefore allowing fourteen ſquare feet and a half for the ſuperficies of a man's body, it muſt ſuſtain a preſſure of 31320 pounds, when the air is of a mean gravity. This prodigious weight would cruſh us into a very ſmall compaſs, but that it is equal on every part, and counter-balanced by the equal re-action of the ſpring of the air within us.—The difference of the weight of the air which our bodies ſuſtain at one time more than another is alſo very conſiderable, being about 2500 pounds leſs when the air is lighteſt than when it is heavieſt; which difference of preſſure muſt greatly affect us in regard to the animal functions, and therefore it is no wonder we ſometimes ſuffer in our health by a change of weather: nay, when we conſider that this variation is often very ſudden, it is ſurprizing that every ſuch change does not break the frame of our bodies to pieces.

preſſure of the external air will be ſo great on the mercury, as to cauſe it to deſcend through the pores of the wood in form of a beautiful ſhower, which will ſhine in a dark room. 13. The lighteſt and heavieſt bodies deſcend with equal velocity *in vacuo:* thus a guinea and a feather, let fall from the top of a tall exhauſted receiver, arrive at the bottom both together. 14. It appears, that air is neceſſary to the exiſtence of fire and flame; for a piece of burning charcoal, or a lighted candle, is preſently extinguiſhed in the exhauſted receiver: neither will gunpowder flaſh or make any exploſion therein, but melt and die away. 15. Air is likewiſe ſhewn to be the medium of ſounds; for a bell rung *in vacuo* is not heard, but as the air is admitted into the receiver, the ſound increaſes in proportion. 16. That fermentation and putrefaction depend on the air, is ſhewn by preſerving fruits in their native bloom and perfection thro' the winter in an exhauſted glaſs: and eggs, which in the air ſoon grow ſtale and putrid, retain their goodneſs a long time *in vacuo.* 17. How neceſſary air is to vegetation appears from hence, that ſeed ſown in earth kept under an exhauſted receiver will not grow at all *. 18. Air is likewiſe abſolutely neceſſary to moſt ſorts of animals, though ſome will live a long time *in vacuo*, whilſt others expire preſently *.

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* A trial of this was made by ſowing lettuce-ſeed upon ſome earth in the open air, and ſome of the ſame ſeed, at the ſame time, upon other earth in the glaſs-receiver of the air-pump, which was afterwards exhauſted. The ſeed expoſed to the air grew up an inch and half high within eight days, but that in the exhauſted receiver did not appear. The air being then re-admitted into the receiver, in the ſpace of a week the ſeed ſprung up to the height of two or three inches.—See Phil. Tranſ. No. 23.

THE ſame Otho de Guerick, who invented the Air-pump, contrived a new ſort of Air-gun, which diſcharged ſhot by the rerefaction of the air, whereas the common Air-guns produce their effects by its compreſſion. Dr. Papin improved upon de Guerick's invention, and experiments were made before the Royal Society to try the force of his machine; which was very conſiderable, but not equal to thoſe whoſe ſtructure is founded on the compreſſion of the air. Of theſe the moſt common and portable kind conſiſts of two barrels, one of a ſmall bore, into which the bullet is rammed as in other guns, and another on the outſide of this, ſo large as to leave a ſpace between them, wherein the air is to be incloſed. Into this cavity the air is injected thro' a valve, by a ſyringe fixed in the ſtock of the gun, and the diſcharge is made by drawing a trigger, which opens another valve, whereupon the compreſſed air ruſhes thro' a hole into the inner barrel, and expels the bullet with great violence. There is alſo a contrivance in the lock, that either the whole charge of air may be ſpent at one exploſion, or only part of it, and the reſt reſerved for freſh bullets; but the force is much the greater, if all the air be diſcharged upon one ſingle bullet.—The Magazine Air-gun is ſo contrived, that ten bullets, lodged in a cavity near the place of diſcharge, may be drawn one by one into the ſhooting barrel, and ſucceſſively exploded in a very expeditious manner. Dr. Burnet takes notice of a gunſmith at Baſil, who ſhewed him one of theſe machines, and pretended the invention was his own, which muſt be acknowledged to be curious; but as the diſcharge of Air-guns is attended with an inconſiderable report compared to that of fire-arms, nor is there any flaſh like that of gunpowder to diſcover from what hand the ſhot comes, it ſeems the intereſt of mankind (as the Doctor obſerves) to forbid the uſe of inſtruments ſo convenient for private aſſaſſinations.

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* Dr. Derham obſerved, from divers experiments he made, that animals whoſe hearts have two ventricles and no Foramen Ovale, as birds, dogs, cats, rats, mice, &c. die in leſs than half a minute under a ſmall exhauſted receiver. A mole died in one minute: a bat remained *in vacuo* four minutes and a half, and revived upon re-admitting the air; but in twenty minutes he was dead beyond recovery. Waſps, bees, graſhoppers, and other inſects, appeared dead in two minutes; but revived in the open air, after they had lain twenty-four hours *in vacuo*. Snails continued twenty-four hours under the exhauſted receiver, and ſeemed not much affected. Frogs and toads bear the pump a long time, eſpecially the former; one of which recovered in the open air, after remaining eleven hours in the receiver.—Fiſh are not eaſily killed by the air-pump. At firſt they appear greatly diſturbed, ſwoln and ſickiſh; but Mr. Hawkſbee ſays, he has kept them a week *in vacuo*, and found them as lively as thoſe which had been kept as long in the air.—Slow-worms, according to Mr. Boyle, will live two or three days *in vacuo*, and leeches five or ſix.

As the Germans have been famous for their improvement of the art of Chymiſtry, we think this is no improper place to introduce ſome obſervations on that ſubject. Chymiſtry, or Chemiſtry (as it is now commonly written) is the art of ſeparating by means of fire the ſeveral ſubſtances of which mixed bodies conſiſt, and of compoſing new bodies by the mixture of different ſubſtances or ingredients. If we endeavour to find the origin of this art, we muſt look back into the antediluvian world, where it was practiſed, as ſome think, by Cham the ſon of Noah; but the invention is more commonly aſcribed to Tubal Cain, who firſt prepared braſs and iron for the uſe of man, which he could not have done without a competent knowledge of chemiſtry. Profane authors refer it to Vulcan; and ſeveral learned men have made it appear very probable, that Tubal Cain and Vulcan were the ſame, which ſeems to be confirmed by the great reſemblance between their names. The next chymiſt we read of is Moſes, whoſe ſkill in this art is evident, from his burning and pulverizing the golden calf, and giving it the people to drink; for the rendering gold potable is one of the moſt difficult operations in chemiſtry: but we are rather inclined to think this was done by a miraculous power. The invention of chemiſtry is by others referred to Hermes Triſmegiſtus, an ancient king of Egypt, from whom it has obtained the name of the Hermetic Art. From the Arabians, by whom the art was eſteemed and practiſed, it ſeems to have had the name of Alchymy; but theſe people rendered it ridiculous by their extravagant ſuperſtitious reaſonings, and their pretended tranſmutation of metals. And here it is to be obſerved, that chemiſtry at firſt had only metals for its object, whereas the bounds of it have been much enlarged in later ages, being extended to the animal and vegetable, as well as the mineral kingdom; and the moderns have applied it with great ſucceſs to the preparation of medicines for curing the diſeaſes of the human body.

At the declenſion of the eaſtern empire chemiſtry ſhared the common fate of the other arts, and lay buried and neglected till the time of our friar Bacon, by whom it was in a good meaſure retrieved. He was followed by Raymund Lully, Baſil Valentine, Paracelſus, Van Helmont, and others, who ſpread the art in Spain, Italy, and Germany; and the two laſt eſpecially carried it to ſuch a length, as to render medicine almoſt wholly chemical. Lemery a Frenchman, Homberg a German, and our ingenious countryman Mr. Boyle, diſperſed the darkneſs of the art, reducing it to ſimple and true ideas, and aboliſhing thoſe uſeleſs and impracticable circumſtances, with which ſome of their predeceſſors had deſignedly clogged its operations. But of all the moderns none have made greater improvements in chemiſtry, or more judiciouſly and beneficially introduced it into medicine, than the late celebrated Boerhaave: who is alſo the fulleſt and beſt writer on the ſubject, having given us the hiſtory, theory, and practice of this noble art in an orderly and ſcientifical manner,

IT is well known that the chymiſts, or rather alchymiſts of Germany, and ſeveral other countries, have employed much time and pains in ſearch of what is popularly called the Philoſoher's Stone, or a preparation capable of tranſmuting or exalting impurer metals, as tin, lead, and copper, into gold and ſilver*. Another object of their

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* Borrichius, a learned Dane, has taken great pains to prove that alchymy was known to the ancient Greeks and Egyptians; and Conringius, with equal addreſs, has endeavoured to ſhew its novelty. Kirchir aſſerts, that the Egyptians were not ignorant of the art; but he adds, that the ſecrets of it were confined to the royal family, and handed down traditionally from father to ſon, without being committed to writing or made publick: and yet ſome authors obſerve, that Diocleſian, after the taking of Alexandria, ordered all the books written by the Egyptians to be burnt, wherein the great myſteries of chemiſtry were contained, that it might not be in their power to enrich themſelves by that art, and thereby put themſelves in a condition of revolting. Be this as it may, the firſt writer we know of that ſpeaks of making gold is Zoſimus the Panopolite, who lived towards the beginning

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ſtudies has been to find out an univerſal medicine, adequate to all diſeaſes, ſometimes called by way of eminence the Grand Elixir; but moſt alchymiſts are of opinion that theſe two things coincide, ſo that what will make gold will cure all diſtempers *. The making of gold has been attempted three different ways, viz. firſt by Separation; for every metal yet known contains ſome gold, but in moſt of them the quantity is ſo little, that it will not defray the expence. The ſecond is by Maturation, or ripening, which relates only to quickſilver; for the alchymiſts hold mercury to be

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of the fifth century, and who has an expreſs treatiſe on the divine art of making Gold and Silver, ſtill extant in manuſcript in the French king's library. Gazeus, another Greek writer towards the end of the ſame century, tells us, that ſuch as are ſkilled in the ways of nature can take ſilver and tin, and change them into gold. Hence it appears, that ſome ſuch art as alchymy was in being in that age, but neither of thoſe authors relate how long it had been known before. After this time writers on the ſubject of alchymy are more frequent, and particularly Geber the Arab, who is ſuppoſed to have lived in the ſeventh century, has a Treatiſe on the Philoſopher's Stone, from whence the hint of an univerſal medicine ſeems to have been taken. But we do not find this myſterious part of chemiſtry brought into much reputation till the fourteenth or fifteenth century, when it ſpread itſelf throughout Europe; and ſince that time almoſt every nation has had its adepts in alchymy, who have laid claim to the ſecret of the Philoſopher's Stone, or a medicine to cure all diſeaſes. Such were the ſociety of Roſicrucians in Germany, (to name no more) who pretended not only to be maſters of the Philoſopher's Stone, but to be able to protract the period of life, and even to reſtore youth, by means of certain Noſtrums, with other pretenſions equally extravagant.

* Kirchir affirms, that the ancient Egyptians had a method of drawing an Elixir from the hardeſt and moſt precious ſubſtances, which, on account of its ſubtilty and perfection, they called Heaven; and this he takes to be that admirable celeſtial water,

be the baſis and mother of all metals, that its weight might be increaſed by purging it from all heterogeneous bodies, and that by ſubtilizing, purifying, and digeſting it, with much labour and long operation, it might be converted into pure gold. Weight is the inimitable character of gold; but could the impurities of mercury be quite purged out, which does not appear impoſſible, it would, ſay the alchymiſts, be as heavy as gold itſelf; and what, they add, is as heavy as gold is gold, or at leaſt might be made ſuch without any difficulty. The third method is that of Tranſmutation, or a way of turning all metals into gold, by melting them in the fire, and caſting into the fuſed matter a ſmall quantity of a certain preparation, upon which the impure parts are immediately volatilized, burnt, and carried off, and the remaining maſs changed into pure gold. Now that which works this change in the baſer metals is what is meant by the Philoſopher's Stone, and is the grand ſecret in alchymy yet undiſcovered, though ſeveral have pretended to be maſters of it, whoſe veracity on other occaſions is not to be queſtioned.

THE poſſibility of this Tranſmutation, or rather Perfection of imperfect Metals, as ſome would have it called, is a point much diſputed

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water, capable of removing all diſeaſes, called alſo the Philoſopher's Stone, the Vegetable Seed of Nature, the Solar Soul, &c. But the judicious Boerhaave explodes the notion of a Panacea, or univerſal Medicine; and ſhews, from the different cauſes, natures, effects, ſeats, and other circumſtances of diſeaſes, that ſeveral may be cured by one medicine, but all by none. He obſerves, that the moſt univerſal remedies known are Water, Fire, Mercury, and Opium; and that by theſe alone, cautiouſly diſguiſed, ſome have acquired the reputation of univerſal phyſicians.

among philoſophers, the alchymiſts ſtrenuouſly maintaining the affirmative, on ſuppoſition that all metals would equally arrive at perfection, as being compoſed of the ſame matter, were it not for the impurity of their matrices, that is, of the places where they are formed by nature. All that is required, ſay they, in the buſineſs of tranſmutation, is to do that by art, which nature does in many years or ages. But how is this to be effected? How is ſo impure a metal as lead, for inſtance, to be exalted into gold? Why, if we conſider the weight of lead, there is nothing in nature ſo heavy, gold and mercury only excepted; whence it is plain there is ſomething in lead that comes very near to gold, but there is alſo ſome heterogeneous matter different both from gold and mercury. Now if we had any body which would ſo agitate the parts of lead as to purge off all that is not pure mercury, and had ſome ſulphur to fix the mercury, would not the maſs be converted into gold? If eleven ounces of lead be diſſolved by the fire, and ſo purified as to come to fourteen, we ſhall then have changed it into mercury, which is ſpecifically heavier than lead in that proportion; and if we farther purify the mercury from fourteen to nineteen, the ordinary ratio of the weight of gold to that of mercury, we ſhall then have gold; provided, as before obſerved, we can find a ſulphur to fix the mercury *.—Such is the foundation of the Philoſopher's

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* The fixing of mercury, among alchymiſts, denotes the rendering it capable of bearing the fire without evaporating, and of enduring the hammer. This they ſuppoſe is to be done by a certain ſulphur, the common cement of all metals; and could they find this out, they would be able to make gold, or at leaſt ſilver.——We have an account in the Memoirs

loſopher's Stone, which the alchymiſts hold to be a moſt ſubtile, fixed, concentrated fire, that unites itſelf by a magnetic virtue to the mercurial body of any metal it meets with, volatilizes and throws off all its impurities, and leaves nothing but a maſs of pure gold behind.

THIS is the grand ſecret, which alchymiſts of various nations, encouraged by kings, princes, and nobles, have been in diligent ſearch of for many ages. Vaſt ſums of money have been advanced, and innumerable experiments have been tried for this purpoſe; but all the learning, labour, and expence employed about it have not yet been able to make the expected diſcovery. It is therefore ſurprizing, after ſo many books written, ſo many queſtions debated, and ſo many operations performed in vain, relating to the art of making gold, that we ſhould ſtill find people purſuing the ſame romantic ſcheme, which generally ends in the ruin of the projectors themſelves, and then perhaps of ſome wealthy perſons who

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Memoirs of the Royal Academy of Sciences, of a chymical operation made by M. Homberg on the fæcal matter, or human excrements diſcharged by ſtool; which it was ſuggeſted to him would yield, by diſtillation, an oil clear as water, and without any ſmell, that had the property of fixing mercury into fine ſilver: to procure as promiſing a matter for this experiment as he could, he agreed with four healthy young fellows, whom he ſhut up for three months, that they ſhould eat nothing but the fineſt bread, (which he ſupplied them with freſh every day) and drink the beſt champaign. After a long proceſs, and numerous eſſays on the excrements they made, he obtained the clear inodorous oil; but it had no effect on the mercury, which was the great point in view. However, though he miſſed his aim, he fell on ſomething he did not dream of, viz. a Phoſphorus; for he found that the caput mortuum of the oil (ſo the chymiſts call what remains in the retort) had the ſurprizing property of taking fire of itſelf, being laid on paper or other combuſtible matter.

are infatuated enough to believe them, and riſque their fortunes in an undertaking ſo extravagant, and always hitherto unſucceſsful *.

On this ſubject an ingenious French writer juſtly obſerves, that it is folly to attempt the making of gold, without knowing the nature and eſſence of thoſe firſt principles which compoſe it; nay, were we as well acquainted with them as we are now ignorant of them, the manner of uniting and combining thoſe principles together would be an operation ſurpaſſing our ſkill. Nor is it without wiſe and good reaſons, that the Creator has concealed from us the eſſence of metals, and other bodies, thinking it ſufficient for us to know their uſes; for had he given us a perfect knowledge of their nature, it would have made us inattentive to every thing elſe, and inſtead of applying gold to thoſe purpoſes for which it was created, we ſhould have buſied ourſelves in making it, and thereby rendered it leſs valuable, as it became more common. Such a knowledge would make us break in upon that order and œconomy which providence has eſtabliſhed in the world, and defeat the wiſe end it propoſed in making the productions of one country different from thoſe of another; for had we the art of making metals, the ſame degree of knowledge would enable us to make wine, by mixing and proportioning the principles of which it is compoſed, without waiting the return of the vintage: we ſhould think it beneath us to ſtand indebted to the common courſe and order of nature, and the uſu-

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* In ſearch of gold his art the chymiſt tries,
And vainly hopes what nature ſtill denies.
Believe me, friend, the Philoſophic Stone
Is INDUSTRY, and INDUSTRY ALONE.

al methods of huſbandry and agriculture, for a ſupply of our wants, being able to furniſh ourſelves in a ſhorter way with all the neceſſaries and conveniencies of life, even thoſe which are now the productions of different countries. Were we thus perfectly ſkilled in all the ſecrets of nature, and maſters of all its powers, there would be an end of all commerce, the very bonds of ſociety would be broken, and the inhabitants of the whole earth be like ſo many recluſe philoſophers, having all things within themſelves, and independent one of another: all intercourſe of friendſhip and mutual kindneſs would conſequently ceaſe, men having no longer occaſion for any exchange of civilities and good offices: nay, there would be no opportunity for the exerciſe of juſtice, prudence, compaſſion, courage, or good nature, according to the circumſtances of time, place, or perſon. In a word, ſuch a knowledge as we have mentioned would neceſſarily be attended with the loſs of thoſe virtues, which, together with our mutual wants, conſtitute the very life and ſoul of ſociety.

TO what we have ſaid on ſome of the moſt ingenious and uſeful inventions that are generally ſuppoſed to have had their riſe in Germany, we ſhall add a brief account of the trade and manufactures of that country. Several cities in Germany are famous for making curious toys in wood, ivory, and all ſorts of metal; and Nuremberg in particular has carried on a great trade in ſuch commodities, but it is now much decayed. Augſbourg is likewiſe remarkable for its goldſmith's wares, clocks, and all kinds of pretty toys, which are ſent into Poland and the north of Europe: but in moſt works of this nature the Engliſh artizans have of late years excelled, and ſerved foreign countries with their manufactures, to the great detriment both of Augſbourg and Nuremberg, which had been in poſſeſſion of this trade for ſeveral centuries. A great number of hands are employed at Ulm in dreſſing leather, and in the manufactures of linen, cotton, and fuſtians, beſides their iron-wares and clock-work; by which it is become one of the richeſt cities in Germany.—But the Imperial city of Hamburgh, with reſpect to commerce, eclipſes all the reſt, and may be ſtiled by way of eminence the Port of Germany, being ſeated with all poſſible advantages for trade, both foreign and domeſtic. The Elbe, on which it ſtands, and the many other navigable rivers that fall into it after a courſe thro' ſome of the richeſt and moſt trading parts of Germany, furniſh it with all the product and manufactures of Auſtria, Bohemia, and Upper and Lower Saxony. By the Havel and Sprehe it has a trade with the electorate of Brandenburgh, and by a canal from the Sprehe to the Oder its commerce is extended into Sileſia, Moravia, and Poland. There is likewiſe a channel opened from the Elbe to the Trave, for the ſake of communication with Lubeck and the Baltick ſea, without the trouble and hazard of ſailing round the coaſt of Jutland, and the obſtructions of the toll and other difficulties of the Sound. The chief commodities exported from Hamburgh are linen-yarn and linens of ſeveral ſorts and countries, particularly Sileſia diapers, the lawns of Miſnia and Luſatia, dowlaſſes and other ſtrong linen from various parts of Germany; wire of iron, braſs, and ſteel, chiefly from Upper Saxony; kid-ſkins in great numbers from Brandenburg; beſides pipe-ſtaves, wainſcot-boards, oak-plank, oil, and whalebone; of which laſt articles (though they have a very good ſhare in the Greenland whale-fiſhery themſelves) they are obliged to purchaſe conſiderable quantities from the Dutch, more than their ſhips can ſupply them with, by reaſon of their vaſt trade up the Elbe into Germany.

Of the numerous commodities the Hamburghers import from abroad, the woollen manufactures of England are the chief; of which thoſe ſent yearly from Yorkſhire only, and generally ſhipped at Hull, are ſaid to amount to above 100,000l. The ſingle article of ſtockings comes to 20,000l. at leaſt; and, in ſhort, all the Engliſh goods vended at Hamburgh amount to ſeveral hundred thouſand pounds *per annum.* Theſe goods are ſent, by the Elbe and other navigable rivers, to innumerable markets in the northern parts of the empire, and particularly vaſt quantities are ſold at the fairs of Leipſick, which are reſorted to by merchants from moſt countries in Europe. Several manufactures have likewiſe been lately erected at Hamburgh, as the weaving of damaſks, brocades, velvets, &c. the making of fine loaf-ſugar, and the printing of calicoes and linens; all which employ abundance of hands, and are carried on with great induſtry and ſucceſs. In a word, from theſe and other branches of its commerce that might be mentioned, Hamburgh is become a rich and powerful city, and ſtill preſerves its freedom and privileges, notwithſtanding the various attempts of the Daniſh kings to bring it under their dominion.

The city of Bremen, which ſtands on the river Weſer, carries on a very great commerce; in which reſpect it is reckoned inferior to none but Hamburgh in the whole empire. The Bremeners ſend to England, particularly to London, ſeveral ſorts of German linens, and they take off no ſmall quantities of our woollen manufactures, which they diſperſe through the whole circle of Weſtphalia. They likewiſe ſend ſhips (as well as the Hamburghers) to France, Spain, Portugal, and Italy; and alſo to the whale-fiſhery of Greenland. Their inland-trade is very conſiderable to the neighbouring parts of Germany, whither they ſend their beer, printed calicoes and loaf-ſugar, but not refined to that perfection as at Hamburgh. Their other commodities are minerals, timber, cattle, and leather, in dreſſing of which they are very expert; and, upon the whole, Bremen cannot but be a flouriſhing city, having (like Hamburgh) enjoyed a perfect neutrality for a long courſe of years amidſt the wars of Europe.

The foreign trade of Hungary is not very conſiderable, conſiſting chiefly in the exportation of their cattle and wines. Of the former they ſend incredible numbers into Germany, and even Auſtria alone takes off annually about fourſcore thouſand. Some of their wines, particularly thoſe of Tokay, are reckoned as good as any in Europe, and great quantities are ſent into the neighbouring countries. They have no manufactures of conſequence, except thoſe of copper and other hard-wares, the country abounding in metals, tin only excepted.

As to Switzerland, a flouriſhing trade is not to be expected there, conſidering its ſituation amongſt mountains, its want of native commodities to export, and an inclination in the inhabitants to erect manufactures. At Zurich indeed they have a conſiderable manufacture of crapes and calicoes, whereof they export large quantities; but, if we except the peaſants *, the Switzers in general are cloathed with the manufactures of other countries. The merchandiſe they export is chiefly horſes, black cattle, butter and cheeſe; and particularly the French take off great numbers of their horſes in time of war to remount their cavalry and draw their artillery, beſides what are bought by the Italians and other nations. With corn and wine, not having ſufficient of their own growth, they are ſupplied chiefly from the Milaneſe and the circle of Swabia; with ſalt from the Tirol, the Franche Comté, and Bavaria; and, in ſhort, they purchaſe of their neighbours moſt of the neceſſaries as well as conveniencies of life. As therefore their importations exceed their exports, and the balance of trade is againſt them, their governors have endeavoured to prevent the conſumption of foreign goods as much as poſſible, by making ſumptuary laws to retrench all ſuperfluities, eſpecially in furniture and apparel.

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* Dr. Burnet, ſpeaking of the Canton of Bern, which he ſays is more than a third part of all Switzerland, obſerves, that the peaſants are generally rich, and the ſoil capable of great cultivation; in which ſome of them ſucceed ſo well, as to have eſtates to the value of a hundred thouſand crowns: but this, he adds, is not common; though ten thouſand crowns for a peaſant is no extraordinary matter. They live much on their milk and corn, which in ſome places, as about Payern, yields an increaſe of fifteen meaſures for one.—And the author of the Remarks upon Switzerland, at the end of the doctor's travels, takes notice, that the peaſants have their houſes furniſhed with good feather-beds, good chairs, and other conveniencies; that their windows are all of glaſs, and their linen very neat and white, as well for their bedding as their tables.

CHAP. VI.

Of the Seven UNITED PROVINCES.

THE United Provinces, formerly comprehended under the name of Holland, the moſt conſiderable of the Seven Provinces which form one powerful Republick, were anciently reckoned a part of Germany, and therefore ſeem naturally to follow the account we have given of that country. Theſe provinces are ſo low and flat, that they are in continual danger of being overflowed by the ocean, with which they are bounded on the north and weſt; but the inhabitants have guarded againſt the irruptions of that furious element by ſurprizing banks or dikes, the keeping of which in repair is attended with a vaſt expence; and annually employs more men (as Sir William Temple was informed) than all the corn of the province of Holland could maintain. They have alſo made, and ſupport with wonderful care and induſtry, a great number of canals, which ſerve to drain off and receive the waters that would otherwiſe drown their lands; and thus the ſoil, though naturally wet and marſhy, is made to yield moſt excellent paſturage, and ſome corn, but eſpecially the former, whereby they feed vaſt herds of cattle, and are furniſhed with plenty of butter and cheeſe, almoſt the only product of the maritime parts of the country.

NOR is this the only advantage the Hollanders derive from their canals, but an eaſy communication is thereby opened for the conveyance of goods and paſſengers from one city and town to another. Their way of travelling in Trechſchuyts, or covered boats drawn by horſes, is exceeding cheap and convenient; for the fair is not above a penny a mile, and in theſe veſſels a man may read, write, ſleep, eat, or divert himſelf without interruption, and without that fatigue and inconvenience which in a land-journey are almoſt inevitable. In the winter, when the canals are covered with ice, a farmer's wife, with a baſket of butter and eggs upon her head, and her ſkates upon her feet, will ſkim away to market ten or a dozen miles, ſell her proviſions, and in a few hours be at home again with her family. Neither does the ice prevent the carriage of more weighty burdens, for their canals are often loaded with carts and ſledges, the ſame element thus alternately ſerving them in the capacity of land and water.

SIR William Temple obſerves, that Holland is generally flat, and looks as if after a long contention between land and water which it ſhould belong to, it had at laſt been divided between them; for to conſider the great rivers and ſurprizing number of canals that are found in this province, which not only lead to every great town, but almoſt to every village and farm-houſe in the country, and the infinity of ſails that are ſeen moving upon them, one would imagine the water to have ſhared with the land, and the people who live in boats to hold ſome proportion with thoſe who live in houſes. Theſe conveniencies are owing to the nature of the ſituation, and to that level and ſoftneſs of ſoil, which makes the cutting of canals in Holland ſo eaſy a work, as to be attempted by almoſt every private perſon.

THIS ſhort account may give the reader a general idea of the ſoil of the United Provinces, whereof the greateſt part is low and marſhy, except thoſe of Utrecht and Guelderland, which enjoy a higher ſituation. As to their minerals or foſſils, we know of none ſo remarkable as to deſerve particular notice; nor do their vegetable productions afford us any thing that requires a deſcription. There are ſome animals however, which, though not peculiar to theſe Provinces, will fall no where more properly under conſideration; and therefore we ſhall proceed to that branch of natural hiſtory.

ANIMALS.

STORKS, which are birds that delight in watry and fenny countries, are very common in Holland, where they build their neſts on the tops of houſes, and feed on frogs, and ſeveral kinds of uſeleſs or pernicious reptiles. On account of this ſervice great regard is paid to them by the inhabitants, who never wilfully hurt or moleſt them; and therefore to kill a ſtork is an offence puniſhable by the laws of the country*. This bird is larger than the heron, like which it has a long reddiſh bill, but its neck is thicker and ſhorter. The head, neck, breaſt, and tail are white, but the rump and outſide of the wings are black; and its claws are broad, almoſt like the nails of a man. It feeds on ſerpents, frogs and inſects. As it ſeeks for theſe in watery places, nature has provided it with long legs; and as it flies to the neſt with its prey, its bill is ſtrong and jagged, to hold faſt what it has taken. The female lays but four eggs, and ſits for thirty days. But what renders this bird moſt remarkable, is its ſteady love to its parents, whom it never forſakes when they are old, but tenderly feeds and defends them as long as they live. Many ſtories are related of the wonderful tenderneſs and affection the old ſtorks bear to their young, of which the following inſtance is ſufficient *. At Delft, in 1636, a fire broke out in a houſe that had a ſtorks neſt upon it, with young ones which could not then fly. The old ſtork returning with ſome meat to her young, and ſeeing the danger they were in, (the fire having almoſt reached the neſt) made ſeveral attempts to ſave them; but finding all in vain, ſhe at laſt ſpread her wings over them, and ſuffered herſelf to be conſumed in the flames with her offſpring.

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* The Stork is likewiſe much eſteemed and reverenced by the preſent Mahometans in Egypt, as the Ibis was by the ancient Egyptians: but Dr. Shaw ſuppoſes, that the regard paid to theſe birds might originally proceed, not ſo much from the ſervice they are of to a moiſt and fenny country, in clearing it of a variety of uſeleſs reptiles and inſects, as from the ſolemn geſticulations they are obſerved to make as often as they reſt upon the ground or return to their neſts; for they firſt throw their heads backwards, then make a noiſe, by ſtriking the upper and lower part of their bill together, and afterwards proſtrate their necks as it were in a ſuppliant manner, always repeating the ſame motions three or four times.—See Shaw's Travels, p. 428.

The following adventure of the tame ſtork at the univerſity of Tubingen, as related by Mr. Keyſler†, ſhews a degree of underſtanding, which one would ſcarce expect in any animal. “This bird,

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* The Storgè, or natural affection which all or moſt animals have for their young, is an admirable principle (as Dr. Derham obſerves) implanted in them by the wiſe Creator; whereof we have inſtances continually before our eyes. The returns of tenderneſs made by the young to the parent animals, when grown old, are alſo very remarkable. Olaus Magnus obſerves of the crane, that when the parent thro' age are ſtripped of their feathers, the offſpring cheriſh them under their wings, and provide them food. Pliny has a remark to the ſame purpoſe; and he likewiſe tells us, that rats nouriſh their aged parents with extraordinary affection.

† See Keyſler's Travels, 4to. Vol. I. p. 101.

"ſays he, had lived quietly in the court-yard, "till count Victor Gravenitz, at that time a "ſtudent there, ſhot with ball at a ſtork's neſt "near the college, and probably wounded the "ſtork in it, as for ſome weeks he was not ob"ſerved to ſtir from his neſt. This happened in "autumn, when the foreign ſtorks ſet out on their "periodical emigration. The following ſpring "a ſtork was obſerved upon the roof of the col"lege, and by its continual chattering, gave the "tame ſtork, which was walking in the college"court, to underſtand, that it was deſirous of its "company; but this being impracticable, by rea"ſon of its wings being clipped, the ſtranger "with the greateſt caution came down to the up"per gallery, the next day ſomething lower; and "laſtly, after abundance of ceremonies, alighted "in the court. The tame ſtork, not conſcious "of any crime, went and met him with a ſoft "chearful note, a ſincere indication of courteſy "and friendſhip; when, to his aſtoniſhment, the "other furiouſly fell upon him. Some ſpectators "of this interview, for that time, immediately "put the foreign ſtork to flight, yet was it ſo lit"tle diſcouraged, that the very next day it retur"ned to the charge, and during the whole ſum"mer, frequent ſkirmiſhes paſſed betwixt theſe "birds; for Mr. T. had given orders that the tame "ſtork, having but one antagoniſt to deal with, "ſhould not be aſſiſted. Being thus put to its "ſhifts, it began to ſtand better upon its guard, and "made ſuch a vigorous reſiſtance, that at the "end of the campaign the ſtranger had little to "boaſt of; but the ſpring enſuing, inſtead of a "ſingle ſtork, came four, which, without any "of the foregoing ceremonies, lighted at once "in the college-court, and made at the tame "ſtork. This peaceable fowl, in preſence of "many ſpectators from the galleries, performed "exploits, if I may be permitted the expreſ- "ſion, above the valour of man, defending it- "ſelf, and aſſaulting its enemies with the moſt "vigorous intrepidity, till at length overpowered, "and its ſtrength being ſpent, it was falling un- "der the redoubled ſtrokes of the enemy, when "ſome very unexpected auxiliaries appeared. All "the turkey-cocks, ducks, geeſe, and the whole "poſſe of fowls which were brought up in the "court, and to whom this gallant ſtork had un- "queſtionably indeared itſelf by its mild and "friendly carriage, braving the danger, formed "as it were a rampart for it, by means of which "it might make an honourable retreat from ſo "unequal a fight: even a peacock, which be- "fore would never be upon good terms with it; "on this occaſion, however, ſided with oppreſſed "innocence, and was, if not a ſtanch friend, "at leaſt a favourable judge on the ſtork's ſide. "This occaſioned a ſtricter watch to be kept "againſt all ſuch treacherous incurſions, and a "ſtop was put to any farther blood-ſhed, till in "the beginning of the third ſpring above twenty "ſtorks made a ſudden ſtoop into the court, and "before the poor ſtork's life-guards could form "themſelves, or any people could come to his "aſſiſtance, they murdered it; however, under "ſuch diſparity, it exerted all its former hero- "iſm, and made them pay dear for their baſe aſ- "ſaſſination. The rancour of theſe ſtrangers "againſt the innocent creature could proceed on- "ly from the gun fired by count Victor, and "falſely conſtrued to be done by the inſtigation "of the tame ſtork."

The ſtork is what we call a Bird of Paſſage, leaving Holland on the approach of winter, and returning again in the ſpring, like ſeveral other birds, the time of whoſe departure we are pretty well acquainted with, but to what countries or places they retire, is a queſtion about which the moſt curious enquirers into nature are very much divided *. The vulgar notion of their flying to the

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* Perhaps the reader will not be diſpleaſed if we enlarge a little on this curious article of natural hiſtory, and give him the ſentiments and obſervations of the moſt eminent writers on the ſubject. Olaus Magnus is of opinion, that in the winter ſwallows hide themſelves in holes or under water, and ſays, it is a common thing in the northern countries for the fiſhermen to draw them up in cluſters, hanging together head to head, feet to feet, &c. He adds, that ſuch a cluſter being accidentally carried by ſome boys into a ſtove, the ſwallows, after thawing, began to fly about, but weakly, and for a very little time. To the ſame purpoſe Etmuller relates, that he himſelf had found above a buſhel of ſwallows under the ice in a fiſh-pond, all dead to appearance, but the hearts ſtill retaining their pulſation. Theſe accounts are confirmed by Dr. Colas, who informed the Royal Society, that he had ſeen ſixteen ſwallows drawn from under the ice by fiſhermen's nets out of the lake of Samrodt, and about thirty out of a great fiſh-pond; that he alſo ſaw two ſwallows juſt come out of the water, which could ſcarce ſtand, being very wet and weak, with their wings hanging on the ground; and that he had often obſerved theſe birds to be weak for ſome days after their appearance. Notwithſtanding all theſe teſtimonies, ſeveral ingenious naturaliſts are of quite different ſentiments, and particularly Mr. Willoughby, who thinks that ſwallows in winter retire to Egypt and Ethiopia; and perhaps the ſtork retreats to the ſame countries. This laſt conjecture ſeems the more probable when we conſider, that at the time theſe birds leave us the inundation of the Nile is over, the waters are daily ſubſiding, and the marſhes abound with aquatic animals, the proper food of the ſtork; and it is well known that ſtagnating waters produce flies of various ſpecies, which are ſuitable food to the ſwallow and martin. During our winter therefore we may ſuppoſe them to ſtay in thoſe countries

the moon is too extravagant to require any confutation; and it is equally unreaſonable and unphiloſophical to ſuppoſe (as a late writer has done) that they ſoar above the atmoſphere in their paſſage

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countries, where every thing at that time is in its bloom and beauty, till the ſcorching heats induce them to ſeek a milder climate, and fly from Africa to Europe.—But to clear up this matter as far as poſſible, let us hear what Mr. Cateſby advances on the migration of birds, who ſeems to have treated the ſubject (in Phil. Tranſ. No. 483) with a great deal of judgment. The reports of thoſe we call Birds of Paſſage lying torpid in caverns and hollow trees, or at the bottom of deep waters, this gentleman thinks are ill-atteſted and abſurd; but how he can ſet aſide the ocular teſtimonies above-mentioned, we leave him to conſider. He agrees in the general opinion, that theſe birds fly into other countries, with this additional conjecture, that the places they retire to lie in the ſame latitude in the ſouthern hemiſphere, as thoſe from whence they depart, where the ſeaſons reverting, they enjoy the like temperature of air: but this we think is abſolutely impoſſible, the diſtance being generally too great: nor is there any neceſſity for ſuch a long paſſage, ſince the countries on this ſide the line may anſwer the ſame purpoſe. As to the manner of their travelling, it is probable that ſwallows, martins, and other birds, whoſe wings by their length and continual exerciſe are fitted for long flights, can ſtretch over wide ſeas, and perform their journey much ſooner than thoſe with ſhort wings, ſuch as the redſtart, nightingale, &c. Theſe birds we ſuppoſe (with another writer on this ſubject) fly from hedge to hedge, and from field to field, feeding as they go, till they come to the neareſt ſea-coaſt; and if they have ſtrength to fly over, they can then eaſily make their way to the ſouthern parts of Europe. And perhaps, as Mr. Cateſby obſerves, the ſame ſagacity that inſtructs them to change climates, may direct them to the narroweſt part of our channel, to avoid the danger of paſſing a wide ſea; though indeed ſome of theſe ſhort-winged birds are capable of longer flights than we are apt to imagine; for Bellonius relates, that he has ſeen quails, which by their ſtructure ſeem little adapted for ſuch journeys, paſſing and repaſſing the Mediterranean in great numbers, at the ſeaſons when they leave us and viſit us again.

ſage to diſtant countries: for birds would quickly die if removed beyond the maſs of air that ſurrounds the earth, for want of that preſſure which is the ſpring of internal motion in the animal machine;

As to winter birds of paſſage, viz. the fieldfare, red-wing, wood-cock, and ſnipe, they retire from us to the northern parts of the continent, where they breed and remain during the ſummer, and at the return of winter are driven ſoutherly in ſearch of food, of which they are deprived by the ice and ſnow in thoſe frigid regions. The woodcock and ſnipe Mr. Cateſby has frequently known to continue here the ſummer and breed, ſo that he reckons the fieldfare and red-wing the only birds of paſſage that conſtantly and unanimouſly leave us at the approach of ſummer; which indeed is very unaccountable, there being no apparent neceſſity for their departure, either on the ſcore of food or climate. The place of their retirement is Sweden, and other countries in that latitude; but as they would find them too cold and deſtitute of proviſions, were they to haſten thither directly when they depart from hence, they journey gradually through the more moderate countries of Germany and Poland, and arrive not at thoſe northern regions till the ſeverity of the cold is abated, and proper food may be found for their ſubſiſtence.—The coming of theſe birds to us may then be pretty well accounted for, being directed from the north to our milder climate for their winter ſupport, by an innate principle of ſelf-preſervation; but the cauſe of their departure in the ſpring, when one would imagine they ſhould couple and build their neſts, is yet a ſecret in nature; for if it be ſuggeſted, that they do not leave us till the haws and other berries are all gone, and they are under a neceſſity to ſeek for food elſewhere, this will have little weight, unleſs it can be ſhewn that the northern countries afford them a freſh ſupply; which we are almoſt certain they cannot do. As therefore the food of theſe birds in ſummer is undoubtedly of a different kind from what they eat in winter, one would think they might find ſubſiſtence here in greater plenty, and much ſooner, than in the colder countries to which they remove.——In ſhort, ſays Mr. Cateſby, all we know of the matter ends in this obſervation, That Providene has created a great variety of birds and other animals, with conſtitutions and inclinations adapted to the different degrees

of

machine; as is demonſtrable from reaſon, and from experiments on animals in the exhauſted receiver. Upon the whole it is moſt probable, (not to ſay beyond diſpute) that theſe birds remove alternately from one country to another at certain ſeaſons of the year, taking long flights over ſea and land, in order to enjoy an agreeable temperature of air, and a proper ſupply of food. Theſe ſeem to be the great motives (eſpecially the latter) of this regular migration: but how ſuch unthinking animals ſhould exactly know the beſt time for undertaking their journeys, and alſo whither to go, and how to ſteer their courſe, is really amazing to conſider. Who acquaints their young, that it will ſoon be neceſſary for them to forſake the land of their nativity, and travel into a ſtrange country? Why do thoſe who are detained in a cage expreſs ſo much uneaſineſs at the ſeaſon for the uſual departure, and ſeem afflicted at their inability to join the company? Who is it that aſſembles a council to fix the day of their removal, or ſounds a trumpet to inform the tribe of the reſolution taken, that each individual may be prepared? Who teaches them to obſerve ſuch wonderful order and diſcipline, that not one ſets out till the day appointed, nor a deſerter lags behind? Have they charts to regulate their voyage, or a compaſs to guide them infallably to the coaſt they aim at, without being diſconcerted by rains, winds, or the darkneſs

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of heat and cold in the ſeveral climates of the world, and has given them appetities for the productions of thoſe countries whoſe temperature is ſuited to their nature, as well as knowledge and abilities to find them out. From whence we may infer, that the birds we have been ſpeaking of could no more ſubſiſt in the ſultry climes of the Molucca iſles, than birds of Paradiſe could in the frigid regions of Sweden or Lapland.

darkneſs of the nights? Are they acquainted with the places where they may reſt and be accommodated with refreſhments? And what reaſon informs them, that this or that particular country will yield them more convenient food and habitation than another; that Egypt, for inſtance, will afford them better accommodations than France, or Spain, or any of the intermediate countries over which they direct their flight? —The truth is, they have neither charts, nor compaſs, nor reaſon, but in all this they are guided by that powerful inſtinct impreſſed by the Creator, whereby the ſtork in the heaven knoweth her appointed times, and the turtle, and the crane, and the ſwallow obſerve the time of their coming. Jer. viii. 7.

TOWARDS the mouth of the river Maeſe, and in the Leck, the Wahal, and other branches of the Rhine, there is annually found an extraordinary ſort of inſect, called an Ephemeron *, remarkable for the ſhortneſs of its life, which the name implies. It is a kind of fly, having four wings, ſix legs, and two ſtrait hairy tails. Midſummer is the uſual time of its appearance, and it lives only five or ſix hours, being born about ſix in the evening, and dying about eleven at night; but it muſt be obſerved, that before it aſſumes the figure of a fly, it lives three years under that of a worm, in a cell or caſe of clay. It begins its change or metamorphoſis by ſhedding its coat, which being done, and the little animal thereby rendered light and nimble, it ſpends the few hours of its life in friſking over the waters;

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* Ariſtotle gives the firſt account of this animal, which has alſo been taken notice of by Aldrovandus, Johnſton, and Cluſius; but more particularly by Swammerdam, in an expreſs treatiſe upon it, which Dr. Tyſon has tranſlated.

on which the female drops her eggs, and the male his ſperm on them, whereby they are impregnated. Theſe eggs deſcend to the bottom by their own gravity, and are hatched by the warmth of the ſun into little worms, which make themſelves caſes in the clay, and feed on the ſame till the time of their metamorphoſis. To dig their cells the wiſdom of the Creator has furniſhed them with proper members, their fore legs being formed ſomewhat like thoſe of a mole, and their toothy cheeks (reſembling the claws of lobſters) ſerving them more readily to bore the clay. Theſe worms are of different ſizes, from one inch to three, according to their age; and are all diſtinguiſhed into fourteen annular diviſions or rings, the firſt of which contains the head, the three following the breaſt, and the other ten the belly and tail. As to their colour, the ſmalleſt are blueiſh, ſomewhat inclining to grey; their eyes are brown, but grow black by age; and in time the whole worm becomes of a pale yellow. Having continued in this ſtate about three years, they are transformed into winged animals, leave their cells, and riſing out of the water in the ſummer-evenings they ſkim and play about its ſurface, lay their eggs, and die in a few hours, as above related. During its ſhort life the ephemeron eats nothing, nor is it furniſhed with parts neceſſary for the reception and concoction of food; ſo that the buſineſs of generating and multiplying its kind ſeems to be the ſole end of its transformation.

HERE it may not be amiſs to give a deſcription of thoſe deſtructive reptiles called Pipe-Worms, which are ſometimes bred in vaſt numbers on the coaſt of Holland, and by gnawing their way into the pile-works, of the dikes, where they take up their lodgings and feed upon the wood, have more than once alarmed the Republick with terrable apprehenſions, leſt thoſe fences ſhould be deſtroyed, which defend their country from the fury of the ocean. In the year 1731, the perſons appointed to inſpect into the ſtate of the dikes cauſed a pile that had been driven down in the ſea in 1718 to be drawn up, which appeared ſound on the outſide, but being ſplit in two, was found gnawed through and through by the worms that were lodged in it, ſome of which were above a foot long, though they ſeldom exceed ſeven or eight inches. Another pile, almoſt new, being taken up and ſplit, was found full of little holes from end to end, about the diameter of the ſhaft of a tobacco-pipe.

THE head of this ſea-worm is covered with a ſort of helmet, conſiſting of two ſeparate ſhells, one on the right ſide, the other on the left, with the points of which it penetrates or bores the wood, the duſt or powder whereof is the food of the animal. The fore-part or body of the worm is of a whitiſh ſubſtance, reſembling an oyſter both in taſte and colour, but is not near ſo firm, being ſo extremely ſoft and tender, that it can hardly be touched without breaking. The hind-part is of a firmer texture, and of a greyiſh colour, terminated with a binding or annular protuberance of a ſinewy ſubſtance; from whence proceed two appendages like claws, which are as hard as the helmet, and ſmooth and white as ivory. Between theſe are two little tails, one ſtrait, the other ſomewhat curled at the extremity; both which the worm can lengthen, flatten, ſwell and contract at pleaſure.

THESE worms are ſuppoſed to lay their eggs or ſpawn in the dog days, which being covered with a ſlimy matter ſtick faſt to the ſides of the piles, wherein the young ones, as ſoon as ever they are produced, begin to work themſelves a habitation. When a worm enters a pile, he bores his way ſtrait forward or horizontally, till he meets with a vein of wood to his liking. He then turns and marches up the pile perpendicularly, unleſs he come to the channel of another worm; in which caſe he alters his courſe a little, and then proceeds again in an upright direction: for it is obſerved, that in all the pieces of timber which have been ſplit for the diſcovery of theſe worms, not a ſingle cell or channel has been found interfering or entangled with another, but each runs perfectly clear and diſtinct from the reſt, tho' ſometimes at no greater diſtance than the thickneſs of a card. The worms uſually enter the piles about a foot from the bottom of the water, and as they advance, a white ſlimy matter iſſues from them, which hardens into a ſort of cruſt, and forms a thin and very ſmooth lining for their channels. This pipe or ſhell defends their tender bodies from the roughneſs of the wood, which might otherwiſe tear or hurt them; ſo that they ſlide up and down, or backwards and forwards, without any inconvenience or obſtruction. In theſe manſions the worms live and die, never peeping out of the timber of which they have once taken poſſeſſion.

THOSE who have carefully examined into the ſtructure and operations of theſe inſects obſerve, that they are frequently thruſting out their little tails at the openings where they firſt entered; and it is ſuppoſed that one of the tails ſerves them to diſcharge their excrements, and the other for reſpiration, or to draw up what water they require. As for the two claws with which they are furniſhed, they are probably of uſe to them in climbing up their cells, or deſcending to the aperture at the bottom, whenever they find occaſion.

WORMS of this kind are often very pernicious to ſhips, by boring and eating the planks under water in the manner we have been deſcribing: but when ſhips lie in harbours where theſe vermin abound, it is uſual to ſpread upon their ſides and bottom a compoſition of tar and beaten glaſs, whereby they are prevented from doing the miſchief which would certainly follow the neglect of ſuch a precaution. Thus we ſee (to uſe a natural reflection of an ingenious author) how thoſe formidable floating caſtles, which carry whole armies, and belch out fire and ſmoak on every ſide, ſeeming at once both the glory and ſafeguard of kingdoms, are in danger of being deſtroyed by the bite of an inſignificant reptile; and how ſo mean a creature as a worm, in the hand of God, is a ſufficient inſtrument to teach mankind the weakneſs of all their boaſted ſtrength.

WE ſhall conclude this article with an account of a ſea-animal, (which having been found on the coaſt of Holland, may as properly be mentioned here as in any other place) namely, a Mermaid, a creature generally ſuppoſed half human and half a fiſh, and which is amphibious, being capable of living on land, though the water is its natural and moſt agreeable element. There are many perſons indeed who doubt the reality of mermen and mermaids, and yet there ſeems to be ſufficient teſtimony to eſtabliſh it beyond diſpute *; for

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* Beſides the inſtance of the mermaid found in Holland, we have many others atteſted by good authorities. Larry informs

for ſeveral authors relate, that in the year 1430, after a violent tempeſt which had broke down the dikes in Holland, ſome milkmaids of Edam, a town upon the Zuyder-Zee, going from thence in

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forms us, that ſuch a monſter was fiſhed up in the year 1187 on the coaſt of Suffolk, which was kept ſix months, and ſeemed only to want ſpeech to render it a human creature; but one day it took an opportunity of making its eſcape, and plunging into the ſea was never heard of more.—Another animal of the ſame ſpecies was taken in the Baltic in 1531, and ſent as a preſent to Sigiſmund, king of Poland, with whom it lived three days, and was ſeen by all the court.—In 1560, near the iſland of Manar, which lies a little weſtward from that of Ceylon, ſome fiſhermen brought up, at one draught of a net, no leſs than ſeven of theſe creatures; whereof ſeveral jeſuits, particularly F. Henriques, and Dimas Boſquez, phyſician to the viceroy of Goa, were witneſſes. The phyſician, who carefully examined and diſſected them, aſſerts, that all the parts, both internal and external, were perfectly conformable to thoſe of a human body. —We have alſo an account of a merman ſeen on the coaſt of Martinico, by perſons who gave an exact deſcription of it before a notary, and affirmed they ſaw it wipe its hand over its face, and even heard it blow its noſe. Dr. Pontoppidon, biſhop of Bergen, in his natural hiſtory of Norway, warmly maintains the exiſtence of theſe animals, and obſerves, that there is not the leaſt improbability of there being in the ocean, a fiſh or creature that has a greater reſemblance to the human ſpecies, than to any other, on account of the analogy and reſemblance that is obſerved between various ſpecies of land and ſea-animals, and particularly ſome of the ape-kind; but adds, that it is not at all to be wondered, that the exiſtence of this creature is queſtioned by many, as moſt of the accounts we have of it are mixed with fables. Our author, however, to prevent any offence being taken at the name, chooſes to call thoſe on the coaſt of Norway ſea-apes. Among a number of inſtances of the exiſtence of animals, of very different ſizes, that may go under this denomination, in very diſtant parts of the ocean, he gives a deſcription of one ſeen by the reverend Mr. Peter Angel, who told him, that in the year 1719, when he was about twenty years old, he ſaw, on a point of land, near the ſea, in a boat to Purmerend, found a mermaid left in the mud with a very little water. They took her into their boat, waſhed her clean, and brought her to Edam, where they dreſſed her in women's apparel,

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ſea, in Nordland, a merman lying dead, and caſt aſhore by the waves, with ſeveral ſea-calves and other fiſh. The length of this creature was much greater than what has been mentioned of any before, namely, above three fathoms. It was all over of a dark grey colour; and the lower part, which was like a fiſh, had a tail reſembling that of a porpus. The face was like that of a man, with a mouth, forehead, eyes, &c. The noſe was flat; but the noſtrils very viſible; the breaſt was near the head, and the arms ſeemed to hang to the ſide, to which they were joined by a thin ſkin or membrane; but the hands reſembled the paws of a ſea-calf.

We ſhall omit taking notice of ſeveral accounts the author juſt mentioned received from eye-witneſſes, and from books; and ſhall conclude with giving a deſcription of a ſea-animal mentioned in the hiſtory of Kamptſchatka, publiſhed by order of her late Imperial majeſty, that ſeems very different from thoſe that have been ſeen on the coaſt of Norway, or any other part of the ocean. " Mr. Steller ſaw upon the coaſt
" of America, a new and uncommon ſea-beaſt, which he
" thus deſcribes: its length is about five feet; its head like
" a dog's, its ears ſharp and ſtanding up; and its eyes large;
" upon its upper and under lips it has hairs like a beard;
" its make is thick and round; thicker towards the head,
" thin and ſmall towards the tail; the whole body is covered
" with thick hair, grey upon the back, and red or
" ſorrel towards the belly; the tail fin divides itſelf into
" two, the uppermoſt of which is longeſt. The author was
" extremely ſurprized that he could not diſcover any feet or
" paws, as in other ſea animals. Its appearance in general
" was ſomething like the draught of that creature, which
" Geſner gives under the name of Sea monkey; and the author
" thinks that the name of monkey is not improperly applied
" to this animal, for its remarkable activity and many
" tricks. It ſometimes ſwam after their veſſel for two hours,
" looking firſt at one thing, and then at another, with an
" appearance of ſurprize; and would come ſo near the ſhip,
" that he might be touched with a pole; but would retire to
" a greater diſtance on obſerving any one on board to ſtir.
" He frequently raiſed one third of his body above the wa-

apparel, taught her to ſpin, and fed her in the ſame manner as themſelves. Sometime afterwards ſhe was ſent to Haerlem, where ſhe lived ſeveral years; but could never be brought to ſpeak, or even to attempt it, and always ſhewed an inclination to return to the water. They taught her however to make the ſign of the croſs, and to pay a ſort of reverence to a crucifix; which we ſuppoſe made Parival imagine they had given her ſome notion of a deity.

MISCELLANEOUS CURIOSITIES.

WE have an account that there is ſtill preſerved at Scheveling, a village on the ſea-coaſt about two miles from the Hague, the model of a Land-Ship or Sailing Chariot, which was made for Prince Maurice of Naſſau by a celebrated mathematician. In form it reſembled a boat, was fixed upon four wheels of equal bigneſs, had two ſails, was ſteered by a rudder placed between the two hindmoſt wheels, and was ſtopped either by letting down the ſails, or turning it from the wind. In this machine the prince and his companions uſed to divert themſelves by ſailing along the ſmooth ſtrand; and we are told it was contrived to move with ſuch eaſe and ſwiftneſs, that a briſk gale would carry eight or ten perſons from Scheveling to Petten in three or four hours time,

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" ter, ſtanding erect like a man, ſometimes for half an hour
" together; and then darting under the veſſel, appeared in
" the ſame poſture on the other ſide; and this he would re-
" peat, perhaps, thirty times together. At other times
" he would bring a great American ſea herb, which is flat
" and hollow below like the bottom of a bottle, and ſomething
" ſharp above: this he would toſs about and catch again
" with his mouth, playing a thouſand apiſh tricks with it."

which is about fifty Engliſh miles, the perſon at the helm directing its courſe with very little labour. Biſhop Wilkins mentions ſeveral great men who have deſcribed and admired this curious invention; but we can ſcarce give credit to all that is reported concerning the ſwiftneſs of its motion.

In a hill near Maeſtricht there is a remarkable ſtone-quarry, which has one entrance by the ſide of the Maeſe, where carts can paſs with eaſe, and unload the ſtones on the bank of the river. The quarry runs parallel with the horizon, and by the light of torches affords one of the moſt ſurprizing proſpects imaginable; for the walks are ſpacious and level, and the earth over-head is ſupported by ſeveral thouſands of ſquare pillars, moſt of them twenty feet high, and all wrought with ſuch neatneſs and regularity, that it looks like a ſubterraneous palace. There is very little rubbiſh in this quarry, which is owing to the goodneſs of the ſtone, and the carefulneſs of the workmen; and in ſeveral places are little pools of water, which perhaps have been made on purpoſe for beaſts to drink, and other uſes. When armies march that way, the quarry affords a ſecure retreat for the country people, who convey thither their horſes, cattle, and moveable furniture: and indeed it may well ſerve for ſuch a purpoſe, conſidering its vaſt extent; for Mr. Ellis, who went into it, ſays it is three hours in length and one in breadth, and capable of ſheltering a hundred thouſand men; but the chillneſs of the place coſt him a fit of an ague. The ſtone dug out of this quarry, according to the ſame gentleman, is much like our Kettering; and the Jeſuits have a fine chapel built of it at Maeſtricht.—Let us now

take

take a view of ſome of the principal ſtructures in the United Provinces.

BUILDINGS.

THE churches of Amſterdam are, generally ſpeaking, very handſome ſtructures, and adorned with fine monuments of their admirals and other great men, who have diſtinguiſhed themſelves in the ſervice of their country. The Old Church is a majeſtic Gothic edifice, with a beautiful and lofty ſteeple; and the New Church, which was burnt in 1645, but is now rebuilt, is a fabrick worthy obſervation. A tower of extraordinary height was intended for it, and a foundation laid accordingly upon more than ſix thouſand piles; which however not proving ſtrong enough, the deſign has not been compleated. On the painted windows of this church is repreſented the liberality of the citizens in preſenting the emperor Maximilian with a large ſum of money, and his beſtowing an imperial crown for a creſt to the city. The grate of caſt braſs before the chancel, being kept very bright, makes a pretty appearance; and the organ, which is ſupported by columns of coſtly marble, is remarkable for its number of pipes, and for its imitation of human voices: but the ſumptuous monument of the brave admiral de Ruyter is perhaps the nobleſt ornament of this church, and deſerves the attention of thoſe who have any taſte for excellent ſculpture.

THE great church at the Hague is a magnificent ſtructure, and has a pretty high ſteeple, but is not ſo extraordinary as to require a particular deſcription. The choir is ſeparated from the body of the church by a fine braſs baluſtrade, which kind of ornament is to be ſeen in moſt of the churches of Holland. Many perſons of diſtinction are interred in this church, and amongſt the reſt the baron of Opdam, one of the moſt famous admirals that Holland ever produced. His ſtately monument was erected at the expence of the Republick, a tribute which the Dutch generally pay to the memory of their admirals, and other officers who have deſerved well of their country. Upon the monument there is a long inſcription, giving an account of the baron's great actions, and particularly of the ſea-fight with the Engliſh in 1665, wherein he was killed, his ſhip being blown up in the engagement, ſome ſay by accident, and others by his own order. In this church there is a noble organ, as there is in moſt churches in the cities and great towns throughout the United Provinces.

THE new church at Delft is a very majeſtic building, its ſteeple one of the higheſt and fineſt in the Low Countries, and the chimes the moſt harmonious imaginable, conſiſting of ſeveral hundred bells of different ſizes. But this church is moſt remarkable for a magnificent mauſoleum erected over the remains of William I. prince of Orange, the founder of the Republic, who was aſſaſſinated at Delft by an emiſſary of the king of Spain. His ſtatue is of braſs, completely armed, with ſeveral emblematical figures round him, and proper inſcriptions; the whole of admirable workmanſhip, and executed in a maſterly taſte.

THE great church at Gouda is one of the nobleſt ſtructures of the kind in Holland, and has a ſtately tower, which, together with the church, was burnt down by lightening in 1552, but was rebuilt with more ſplendor than before. The paintings on the windows, which repreſent in the moſt lively colours ſeveral pieces of ſacred and prophane hiſtory, are ſcarce to be paralleled in Europe. They are the work of two brothers, Theodore and Walter Crabeth, who were natives of Gouda, and whoſe performances are reckoned much more beautiful than any thing done by later artiſts in that manner of painting.

MOST of the churches at Middleburg in Zealand are ſumptuous edifices, and worthy a traveller's attention. The tower with a clock on the top of it is particularly remarkable, being very lofty; and the clock, with its dial, is ſaid to have coſt 15,000l. Sterling.

AT Utrecht the churches in general are magnificent, eſpecially that of St. Martin, formerly the cathedral, where Charles the Fifth, in 1536, held a ſolemn meeting of the knights of the golden fleece. It is uſually called the Dome, and has a high tower, aſcended by 460 ſteps, from whence there is a fine proſpect round the country, of fifteen or ſixteen cities, and a vaſt number of conſiderable villages.—The church of St. Mary in the ſame city, commonly called the Engliſh church, is much taken notice of on account of a ſtory concerning one of its pillars. When the workmen began the building, it is ſaid they met with a quagmire where the foundation of this pillar was intended to be laid, and none of them knew how to ſurmount the difficulty. At length one Fuſo, reckoned an ignorant fellow, undertook to do it, but aſked an exorbitant price; which the biſhop not being willing to give, privately dealt with the man's own ſon to pump out the ſecret, which was to cover the quag with bulls-hides. This being done accordingly, and Fuſo diſappointed of his expected reward, he was ſo enraged that he ſtabbed the biſhop, as the ſtory relates. There is a Latin inſcription on the pillar, aſſerting its being built on ſuch a foundation.

At Nimeguen in Guelderland there are ſeveral fine churches, the chief whereof is that of St. Stephen, a noble ſtructure, whoſe roof is ſupported by thirty-five pillars of excellent workmanſhip; and its lofty tower, which was beat down in the war with Spain, has been ſince rebuilt with extraordinary magnificence. In the choir of this church is the tomb of Catharine of Bourbon, wife of Adolphus duke of Guelderland, with her ſtatue in braſs, and ſixteen coats of arms, denoting her deſcent.—The principal church of Zutphen, in the ſame province, is alſo a ſumptuous fabric, with a very high ſteeple built in the year 1635, after having been twice deſtroyed by lightening. It is noted for a fine monument of Otho III, count of Naſſau, and his lady; and for a large braſs font of very curious workmanſhip.

In Dutch Brabant we find ſeveral ſtately and beautiful churches, particularly the great church at Breda, which has a handſome ſpire 362 feet high, and is adorned with many noble monuments of perſons of diſtinction. That of Anglebert II. count of Naſſau, who is repreſented in armour as when alive, is very much admired; the whole being ſuch an exact reſemblance of nature, that it is hardly poſſible for human art to do any thing more perfect.—To this we may add the cathedral at Bois le-duc, now in the hands of the proteſtants, which is one of the moſt ſumptuous churches in the Netherlands.

As to the palaces in the United Provinces belonging to their antient nobility there are ſcarce any that merit a deſcription, except that of the prince of Orange, which ſtands in a pleaſant wood about a mile from the Hague, and is commonly called the Houſe in the Wood on account of its ſituation. It is a neat and beautiful ſtructure, built by Amelia, widow of Henry-Frederic prince of Orange, having an extenſive grove before it, and a large garden behind. The Houſe has a moat round it, over which we paſs by a drawbridge, and enter through a gate into a long ſhady avenue, which leads us to the front of the building. Here we aſcend a grand flight of ſteps, on each ſide whereof there is a ſtatue, one of Ceres, the other of Pomona, both ſomething bigger than the life, and of admirable workmanſhip. On the right are likewiſe placed the ſtatues of William I. and prince Maurice, and on the left thoſe of Henry-Frederic and William II. all of white marble. The grand ſaloon, which is of an octagonal form, takes up the body of the building, and is exceeding beautiful and magnificent, the floor being wallnut-tree, and covered with rich carpets. But the principal ornaments of this ſaloon, and indeed of the whole palace, are the fine paintings done by the moſt eminent Flemiſh maſters, and particularly the celebrated Rubens. That of Vulcan in his ſhop, which is placed near the chimney, is the work of his pencil, and is reckoned the beſt piece in the whole collection. The military exploits of Henry-Frederic, which take up one ſide of the ſaloon, and the picture of the princeſs Amelia in mourning, are likewiſe excellent performances; and in one of the drawing-rooms there is a flower-piece valued at 1500 l. ſterling. The apartments are furniſhed in an elegant and ſumptuous manner; and there is a rail of curious Japan work, that runs along the foot of the princeſs's bed, ſaid to have coſt near three thouſand pounds, being in-

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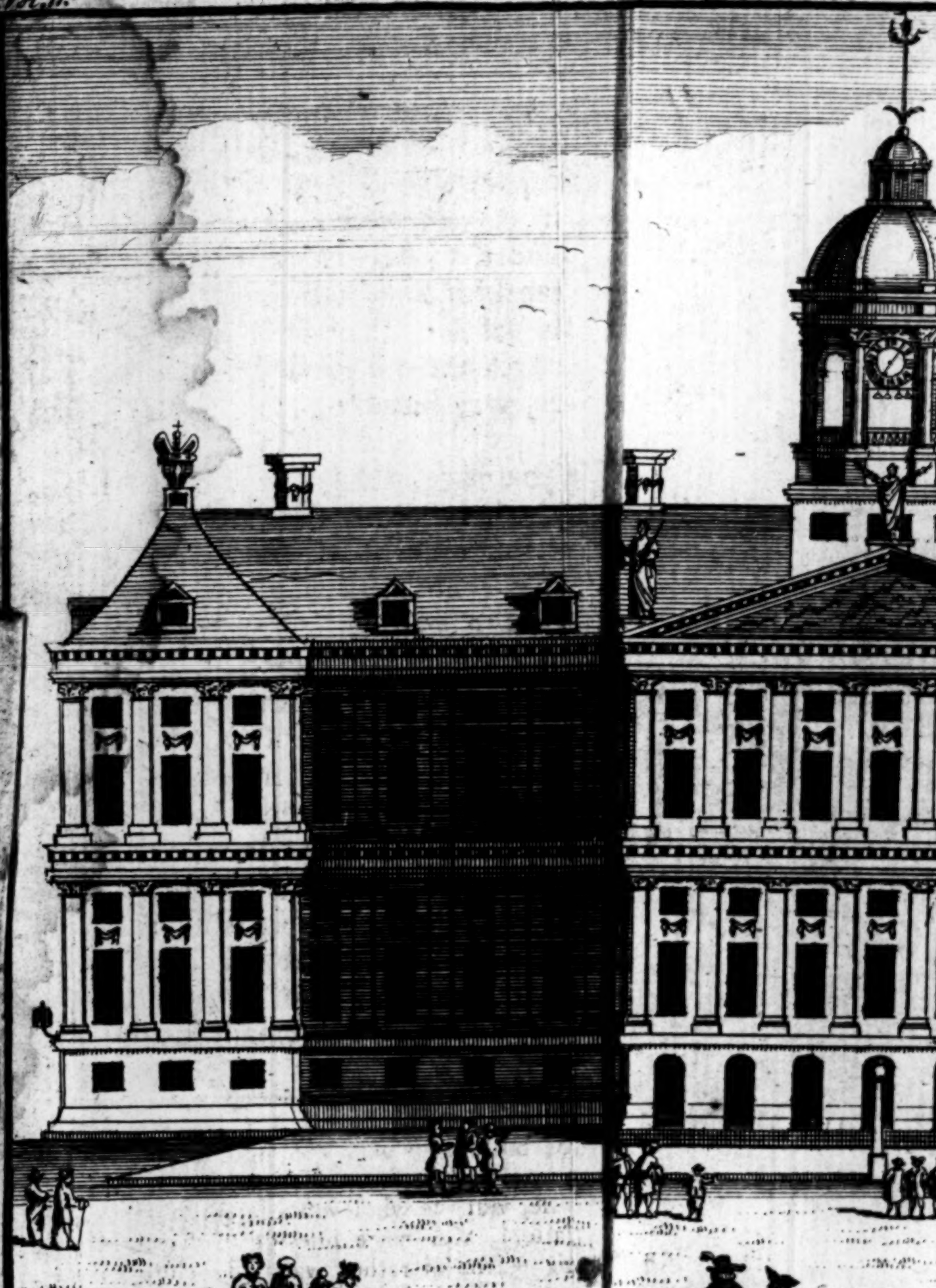
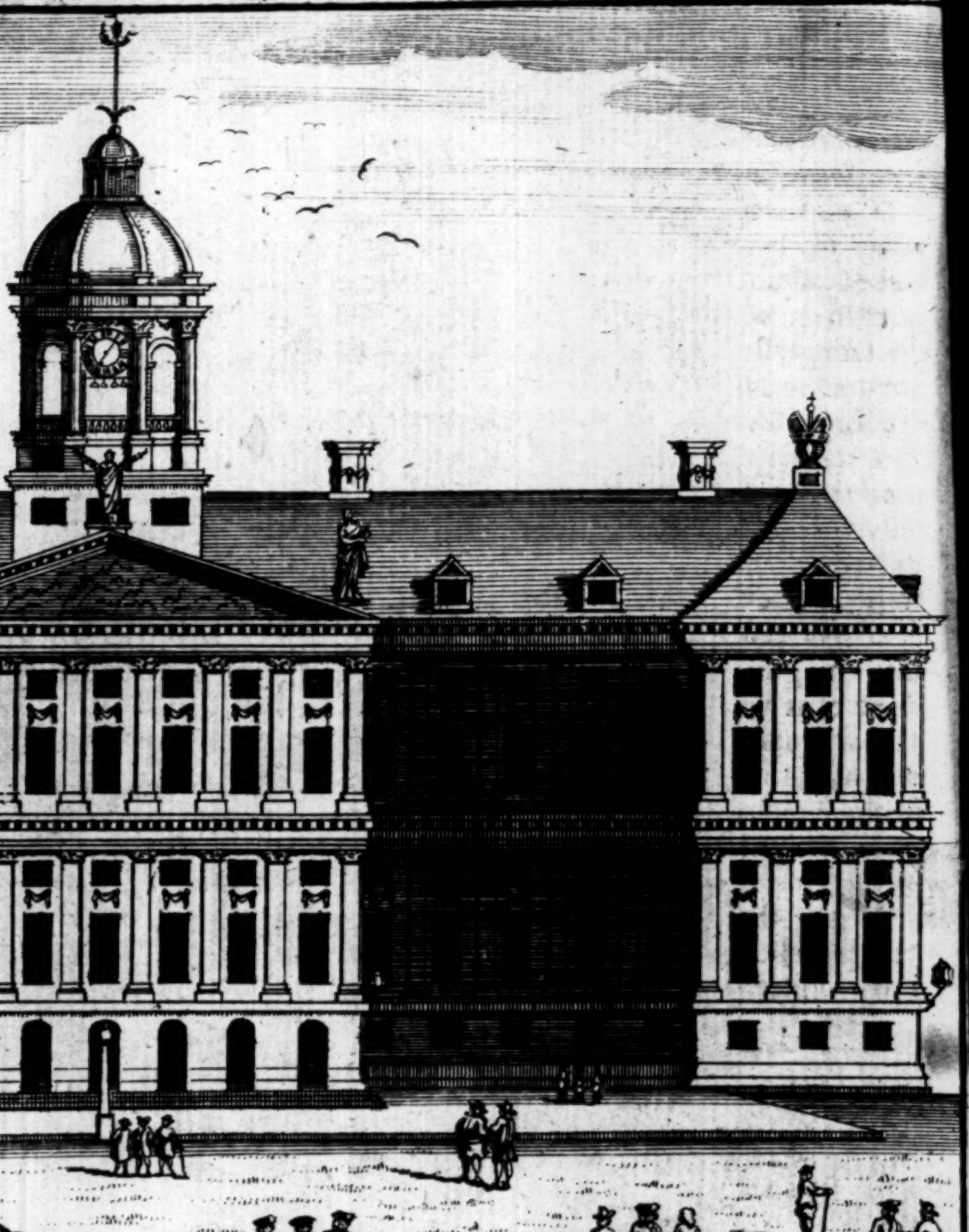


THE STADHOUSE



B. Cole Sc.

SE OF AMSTERDAM.

ſaid with mother of pearl and precious ſtones, which twinkle like the ſtars in a dark night,

On the late prince's marriage with the princeſs royal of Great Britain, his highneſs cauſed two wings to be added to this charming ſeat, which make it abundantly more commodious for a family than it was before. The new building is in the ſame taſte with the old, and the furniture and ornaments every way ſuitable to the beauty of the ſtructure.

There remains yet one fabric to be deſcribed, viz. the Stadthouſe of Amſterdam, which is not only the moſt magnificent in the Seven United Provinces, but is generally thought to ſurpaſs any thing of the kind in Europe. This ſuperb edifice is all of freeſtone, built upon 13659 piles *, driven into the ground cloſe to one another; and the firſt ſtone of it was laid on the 28th of October, 1648. It is a ſquare building, 282 feet in length, 235 in depth, 90 feet high in front, and 160 to the top of the cupola. It has above four hundred windows, and is adorned with a great number of pilaſters of the Corinthian order. On the pediment in the center of the front is an admirable piece of ſculpture in relievo, repreſenting the city of Amſterſtam under the figure of a woman ſitting in a

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* This way of building is very common in the Netherlands, where the ground is ſoft and marſhy; ſo that not only the Stadthouſe, but the whole city of Amſterdam ſtands upon ſuch foundations, viz. large piles of fir driven perpendicularly into the earth, or rather water, ſo cloſe to each other that nothing can be forced between them. Hence that facetious ſaying of Eraſmus, in a letter from Amſterdam to one of his friends, that he was arrived in a city where the inhabitants lived upon the tops of trees. This however is a very expenſive method of building, for the foundation of the Stadthouſe is ſaid to have coſt 100,000l. ſterling.

chair ſupported by two lions, and holding on her knee the arms of the city. In her hand ſhe has an olive-branch, the emblem of peace; and is attended by ſea-nymphs, who preſent her with crowns of palm and laurel. Here are alſo repreſented Neptune and his Tritons, with ſeveral water-animals; the whole in marble, and the workmanſhip extremely curious. At each ſide and on the top of this pediment are placed three brazen ſtatues, repreſenting Juſtice, Fortitude, and Prudence; and juſt behind it there is a handſome dome or cupola, wherein hangs a great number of bells, which compoſe very muſical chimes. In this front of the Stadthouſe there are ſeven doors, or rather open arches, alluding (as is ſuppoſed) to the Seven Provinces of the Republic.—the back front of the building has alſo a pediment, with an excellent baſs-relief in marble, repreſenting the extenſive commerce of the city of Amſterdam under the emblem of a woman with a winged cap on her head, to whom the four parts of the world (denoted by proper figures) offer preſents of their reſpective productions. On the ſides of the pediment are the ſtatues of Peace and Plenty, and on the top of it ſtands a large Atlas with a globe of copper on his ſhoulders.—When we come to view the inſide of this ſtately fabric, we are aſtoniſhed at the profuſion of fine paintings, ſculptures, and other ornaments. The courts of judicature (and indeed the greateſt part of the building) are lined with marble, and adorned with curious emblematical figures or hiſtorical pieces, relating to the diſtribution of juſtice; particularly a repreſentation of Solomon giving judgment between the two harlots: and at the entrance of every office or chamber we find ſome ſculpture, or other decoration, adapted to the nature of the buſineſs therein.

therein tranſacted; all which are executed with ſo much art, that they are admired by the niceſt judges. —We aſcend up ſtairs to the great hall, at the entrance of which are two ſtrong folding doors of braſs, and ſeveral fine marble columns twenty feet high, ſupporting a moſt beautiful cornice. Over this cornice ſits the figure of a woman repreſenting the city, the arms whereof ſhe wears on her breaſt, and an eagle places on her head an imperial crown. At her feet are two lions; on one ſide is a ſtatue of Fortitude, and that of Minerva on the other; and four naked children hover round her with cornucopia's pouring out fruits and flowers. The beauty and magnificence of this hall are hardly to be deſcribed; the ſtately marble pillars, the repreſentation of the four elements at the corners, the exquiſite paintings, ſtatues, and various other ornaments, at once ſurprize and charm the ſpectator: but the greateſt curioſity of all is wrought on its marble floor, on which the celeſtial and terreſtrial globes are repreſented in planiſphere; the conſtellations in the one, and the ſeveral parts of the earth in the other, with the principal circles, being all delineated in braſs very neatly laid into the marble, and the names of the countries expreſſed in the ſame manner. Each hemiſphere is about twenty-two feet in diameter, and the whole is admired by all that ſee it as a moſt ingenious performance. This ſtructure coſt the city of Amſterdam three millions of guilders, or 300,000 l. ſterling, when money was much more valuable than it is at preſent.

Of the DUTCH.

IT muſt be acknowledged that the Dutch are robuſt, laborious, patient, open and affable.

They are all politicians, not excepting the women and ſervants; and even the children are ſaid to be well acquainted with the hiſtory of their country; but the lower part of the people are rude and clowniſh. Mr. Hanway ſays, he has ſeen a boatman in a great city, ſtrut up and down a room with his hat on, his hands on his hips, behaving with a careleſs air of inſolence, to a gentleman who was treating him with civility, and giving him an opportunity of getting a guinea, for an inconſiderable ſervice. This they miſtake for liberty, while their principal knowledge is confined to the common means of gain, and the gratification of the calls of nature. Cheeſe, beer, geneva, brandy, and tobacco, are the joys that ſeem to crown the labours of the common people. Their principal virtue is frugality: they are contented with moderate meals; and frequently a biſcuit, with a bit of butter, cheeſe, or a herring, with a glaſs of beer, or brandy, ſuffices them for a repaſt; but in their cups, they are apt to mix cruelty with their ruſticity, and to fight in a very deſperate manner with their long knives. A Dutch man is, indeed, naturally phlegmatic, and ſlow to anger; but when he is once exaſperated, he is not eaſily appeaſed. Conſtant employment, coldneſs of complexion, and perhaps the nature of their food, are ſuppoſed to contribute to their being but little addicted to love.

THE women in general have little taſte or delicacy in their manners, but are remarkable for their neatneſs in their houſes, which they carry to an extravagant exceſs. As the men are remarkable for wearing many breeches, the women, in cold weather, uſe pots of burning charcoal or turf, ſet into boxes, bored full of holes, and put under their petticoats. This, ſays a modern writer, is not only apt to make them old, from the waiſt downward, before the time ordained by nature, but the ſmell of the coals is offenſive. Thus there is a proverbial ſaying, that "the dirtieſt piece "of furniture in the houſe of a Dutchman, is his "wife."

AMONG the courts of juſtice is one in the province of Holland, worthy of being imitated by all chriſtian countries, it conſiſts of eight or ten members ſtiled peace-makers, who are generally young gentlemen of fortune, who muſt be houſe-keepers and married. Their buſineſs is to make up all quarrels, and to prevent or diſſuade people from going to law. They, with an experienced magiſtrate at their head, alſo take cognizance of civil cauſes, amounting to a ſum, not exceeding ſix hundred guilders, or about fifty-five pounds ſterling. Their method of proceeding is by way of citation: the creditor ſummons his debtor to appear, and after the fact has been ſtated, and both ſides heard, the peace-makers determine what ought to be done, and order the parties to comply with it, but there lies an appeal to the ſchepens or aldermen.

THO' there is no country where ſuch large credit is univerſally given, as in Holland, yet no where does ſo few people languiſh in priſon; for whenever any one acquaints the magiſtrates of his inability to pay his creditors, and lays before them an exact account of his circumſtances, they inſtantly order the commiſſioners of bankrupts to take poſſeſſion of his effects, and exempt his perſon from all arreſts, during ſix weeks, which time is allowed him to compound with his creditors. In the mean time, his books are laid before the commiſſioners for their examination; and all letters directed to him, are delivered to them before he is permitted to peruſe them. When, if his endeavours to compound with his creditors prove ineffectual, and his failure appears to be owing to loſſes and misfortunes, the commiſſioners, when the ſix weeks are expired, ſell his effects, and make a dividend; after which, he is acquitted and exempted from all claims; nor is it in the power of any, or of all his creditors united, to prevent this, when the failure is not fraudulent.

BESIDES this method of preventing the members of the ſtate being confined in priſon, there is another ſtill more expeditious; which is, for the debtor to apply to the principal high court of juſtice, repreſenting his condition, and giving up all he has upon oath; after which he is exempted, as before, from all future claims, and may again engage in trade; but if the debtor is ſo baſe as to take a falſe oath, the magiſtrates are authorized to puniſh him as they pleaſe, and even to ſentence him to ſuffer death.

IT may not be improper to mention here the Raſphouſe, as one of the peculiarities of this country. There felons raſp Braſil wood from three to ten years, or for life, according to the nature of their crime; and when they are incorrigible, or too lazy to work, are frequently put for an hour or two into a room where water comes in, ſo that they muſt be continually labouring at the pump, in order to eſcape being drowned. Here are alſo Spinhouſes, where proſtitutes, and other women of bad character, are kept to ſpinning. Theſe, and other foundations, with the good policy of the city of Amſterdam, have ſuch an effect, that there are no beggars in the ſtreet; all vagabonds being carried directly to houſes provided for that purpoſe, where they are obliged to work, every man in his own buſineſs; and here the poor who want work, and offer themſelves, are received. Beſides, in Amſterdam, and moſt of the conſiderable cities in Holland, is a publick office, where all the poor travellers that can give any account of themſelves, may receive a loaf, a penny, and a paſſport, by virtue of which, they are received gratis into the boats, that carry goods and paſſengers from one town to another.

INVENTIONS, MANUFACTURES, &c.

SEVERAL uſeful inventions have had their riſe in the United Provinces, particularly that of the Spying-glaſs or Teleſcope, one of the nobleſt the modern ages have to boaſt of; by means whereof the wonders of the heavens are diſcovered to us, and aſtronomy brought to a degree of perfection, which it was impoſſible the ancients could ever think of, without the aſſiſtance of ſuch an inſtrument. The invention indeed is rather owing to chance than thought; for it is ſaid, that the children of a certain ſpectacle-maker at Middleburgh in Zealand, playing in their father's ſhop, happened to hold two glaſſes between their fingers, at ſome diſtance from each other, thro' which the weather-cock on the ſteeple appeared much bigger than ordinary, and as if it were very near them, but inverted. With this the children acquainted their father, who, being ſurprized at the ſingularity, bethought himſelf of fixing two glaſſes in braſs circles, and placing them ſo, as to be drawn nearer or removed farther at pleaſure; and by this means he found he could ſee diſtant objects more diſtinctly. This happened towards the beginning of the laſt century, but authors are divided about the name of the Spectacle-maker, though it is generally ſaid to be Zachary Janſen, who ſoon improved his diſcovery ſo far, as to preſent a teleſcope twelve inches long to prince Maurice of Naſſau. In the year 1620 James Metius, brother of Adrian Metius, profeſſor of the mathematics at Franeker, came to Middlebourg, where he bought teleſcopes of Janſen's ſons, who had made them publick; and yet Adrian has given his brother the honour of the invention, which has led other writers into the ſame miſtake *.

NONE of the teleſcopes, however, made by theſe artificers were above eighteen inches long, nor proper for aſtronomical obſervations: but the famous Galileo, aſtronomer to the Grand Duke of Tuſcany, having heard of a ſort of optic glaſs made in Holland which brought objects nearer, ſet himſelf to conſider how it ſhould be †; and having ground two pieces of glaſs into form as well as he could, he fitted them to the two ends of an organ-pipe, and by this means made great diſcoveries in the celeſtial regions, which he ſhewed to the Venetian Nobility on the Tower of St. Mark. From this time Galileo applied himſelf wholly to the improving the teleſcope; and hence the honour of the invention is frequently aſcribed

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* Wolfius will have it, that J. Bapt. Porta, a noble Neapolitan, was the firſt who made a teleſcope, grounding his opinion on what that nobleman ſays in a Treatiſe printed in 1549, concerning concave and convex glaſſes rightly joined together, with which he had aſſiſted many of his friends, who could only ſee objects in a confuſed manner. But it is certain Porta never troubled himſelf about improving his invention, or applied it to celeſtial obſervations; and the account he gives of his glaſſes is ſo dark, that Kepler, who examined it by command of the emperor Rodolphus, declared it was quite unintelligible.

† See a conciſe view of the life and diſcoveries of Galileo, page 89.

to him, and the inſtrument has been denominated Galileo's Tube.

ALL the diſcoveries made by this ſagacious aſtronomer tended to confirm the truth of the Copernican Syſtem, which is now generally received as the true ſyſtem of the world*. In the year 1610, he diſcovered the four ſatellites or moons of Jupiter, (as Simon Marius, mathematician to the elector of Brandenburg, did about the ſame time) but his teleſcope was not good enough to reach thoſe of Saturn, though he found that planet made an odd appearance, which very much perplexed the aſtronomers to account for, and various hypotheſes were formed for that purpoſe. Theſe all ſeemed trifling to M. Huygens, who thereupon applied himſelf to improve the grinding of glaſſes and perfecting long teleſcopes, in order to obtain a more accurate knowledge of Saturn and his appendage; and accordingly in 1565, he conſtructed a teleſcope of twelve feet, with which he diſcovered a ſtupendous ring encompaſſing the body of that planet. With a larger tube he diſcerned a ſatellite revolving round him, and four more were afterwards diſcovered by Caſſini. — It was Galileo who likewiſe firſt obſerved ſeveral dark ſpots paſſing over the ſun's diſk, from whence he appears to have a motion round his axis; and the like phænomena are obſerveable on the ſurface of ſome of the planets.

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* The Copernican or Solar Syſtem of the world is that which ſuppoſes the SUN to be placed in the centre, and the planets and comets to revolve about it in different periods of time, and at different diſtances. MERCURY (for inſtance) at the diſtance of about 32 millions of miles, revolves round the ſun in 87 days, 23 hours, and 16 minutes: VENUS, at the diſtance of about 59 millions of miles, in 224 days, 16 hours, 49 minutes: the EARTH, at the diſtance of about 82 millions of miles, in 365 days, 6 hours, and 9 minutes: MARS, at the diſtancc of 123 millions of miles, in 686 days, 23 hours, 27 minutes: JUPITER, at the diſtance of 424 millions, 4332 days, 12 hours, 20 minutes, or almoſt 12 years: SATURN, at the diſtance of 777 millions of miles, in about 30 years: and the COMETS, whoſe orbits are very eccentric, in different periods and ſituations.

TELESCOPES are of two ſorts, viz. Refracting and Reflecting. A refracting teleſcope conſiſts of an object-glaſs, in the focus * whereof the image of a diſtant object is formed, but in an inverted poſition. This image may be viewed by a ſingle lens or eye-glaſs, as is uſually done in viewing the heavenly bodies, becauſe it is not material whether they appear erect or inverted; but to view terreſtrial objects, whoſe image we would have erect, two other lenſes are neceſſary. If inſtead of a convex glaſs we uſe a concave one of the ſame focal length, it will render the object erect, equally magnified, and more diſtinct and bright: but the diſadvantage of this glaſs is, that it admits of only a ſmall area or field of view, and is therefore not fit to be uſed when we would ſee much of an object, or take in a great compaſs; it is very uſeful however in viewing the planets and their ſatellites, Saturn's ring, &c. And this is properly the Galilean teleſcope.

BUT the Reflecting Teleſcope is the nobleſt and moſt uſeful of all others, which conſiſts chiefly of ſpecula or mirrors inſtead of lenſes, and is the invention of the great Sir Iſaac Newton. What put him upon applying his thoughts this way,

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* By FOCUS opticians mean that point wherein ſeveral rays concur and are collected, after having undergone either refraction or reflection.

was the indiſtinctneſs of viſion by refracting teleſcopes, which he found was owing to the different refrangibility of the rays of light; from whence he concluded, that refraction was too unequal a principle, and that lenſes, of what ever figures, and how truly ſoever ground, would never ſuffice for the perfection of teleſcopes. Upon this he had recourſe to a more equable principle, viz. that of Reflection, and made a teleſcope conſiſting of mirrors, the firſt hint whereof he owns he took from Dr. Gregory's Optics. This inſtrument has ſince received ſome farther improvements, inſomuch that a reflecting teleſcope, not more than twenty inches long, may be made to magnify an object as much as a refracting one ſixteen feet in length.

To the invention of the teleſcope ſucceeded that of the Microſcope, an inſtrument contrived to magnify the ſmalleſt objects, ſo that they may be viewed diſtinctly. By whom microſcopes were invented is not certainly known, but probably we owe the diſcovery to the Hollanders, ſince Huygens tells us that Drebel, a Dutchman, had the firſt microſcope in 1621, and that he was reputed the inventor of it, though the honour is claimed by Fontana, a Neapolitan, who dates it from the ſame year.—They are properly diſtinguiſhed into Single and Compound, the former conſiſting only of one glaſs, and the latter of ſeveral duly combined: and ſome of theſe are contrived to do their office by refraction, others by reflection, and others by refraction and reflection conjointly. A ſingle microſcope is either a lens or a ſpherule; but as little glaſs ſpheres may be made much ſmaller than any lens, ſo the beſt microſcopes, or thoſe which magnify moſt, are of the ſpherical kind *. Mr. Gray, and others after him, have contrived Water-Microſcopes, conſiſting of ſpherules or lenſes of water inſtead of glaſs; but theſe magnify leſs, and are therefore leſs eſteemed. Hollow glaſs ſpheres, of the diameter of half a digit, filled with ſpirit of wine, are frequently uſed for microſcopes, but theſe magnify ſtill leſs than the former.——With regard to double or compound microſcopes, the beſt are thoſe which conſiſt of one object-glaſs, and two eye-glaſſes; for as objects appear dim when viewed through many glaſſes, part of the rays being reflected in paſſing through each, the multiplying of lenſes is not adviſeable. The double microſcope contrived by our countryman Mr. Marſhal is of a commodious and curious ſtructure; but the pocket-microſcope of Mr. Martin, furniſhed with a micrometer to meaſure the ſmalleſt part of an object, is perhaps the plaineſt, the moſt expeditious for uſe, and the cheapeſt of any of the compound ſort hitherto invented.——Here it may be

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* There are various methods of caſting glaſs ſpherules for microſcopes, one of which is thus given us by Dr. Adams. Take a piece of fine window-glaſs, and cut it with a diamond into as many lengths as you think needful, not exceeding an eighth part of an inch in breadth; then holding one of thoſe lengths between the fore-finger and thumb of each hand over a very clear flame till the glaſs begins to ſoften, draw it out till it be as fine as a hair and break. Then applying each end to the pureſt part of the flame, you will preſently have two ſpheres, which you may make larger or ſmaller at pleaſure; but if they continue long in the flame they will have ſpots, ſo that they muſt be drawn out immediately after they become round. As to the ſtem, break it off as cloſe to the ball as poſſible, and lodging the remainder of the ſtem between the plates, and drilling the hole exactly round, all this protuberance is buried between the plates, and the microſcope performs to admiration.—See Phil Tranſ. No. 325.

obſerved, that any teleſcope is converted into a microſcope, by removing the object-glaſs to a greater diſtance from the eye-glaſs; and ſince the diſtance of the image is various, according to the diſtance of the object from the focus, and it is magnified the more as its diſtance from the object-glaſs is greater, the ſame teleſcope may be ſucceſſively converted into microſcopes which magnify the object in different degrees.

Many ingenious foreigners, as well as our countrymen, have applied themſelves with great diligence to improve the microſcope, and by means thereof to lay open the ſecret wonders of nature: and indeed what ſurprizing diſcoveries may we not expect in the minute parts of the creation, from an inſtrument that makes a ſmall grain of ſand appear as big as a nut *, or a hair of the head above an inch in diameter † ? But of all thoſe who have bent their ſtudies this way, none have purſued them with more unwearied application, or made more curious and im-

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* Euſtachio Divini made a microſcope, wherein, inſtead of an object-glaſs convex on each ſide, he uſed two plano-convex glaſſes, ſo placed as to touch one another in the middle of their convexities. On viewing with this microſcope ſmall grains of ſearced ſand, he perceived an animal of many feet, its back white and ſcaly, but ſo ſmall, that though the microſcope ſhewed every grain of ſand as large as an ordinary nut, the animal appeared no bigger than one of the grains ſeen without a microſcope. Philoſ. Tranſ. No. 42.

† Mr. Wilſon's largeſt magnifiers would ſhew to any eye a hair of the head conſiderably above an inch in diameter, and to ſome eyes it would appear two inches; but ſuppoſing it a bare inch, and that (as Dr. Hook affirms) 640 hairs-breadth make an inch, the length and breadth of an object will by ſuch a glaſs be enlarged 640 times, the ſurface 409,600 times, and the ſolidity 262,144,000 times: and yet the beſt of our glaſſes fall ſhort of M. Leewenhoeck's in power and goodneſs. Philoſoph. Tranſ. No. 284.

portant diſcoveries than the celebrated M. Leewenhoeck, a Hollander; and therefore as we are treating of that country, it may not be amiſs to be a little more particular with regard to that gentleman's microſcopes, great part of which he bequeathed to the Royal Society at his deceaſe.

THIS legacy conſiſts of a ſmall Indian cabinet, in the drawers of which are thirteen little boxes or caſes, each containing two microſcopes handſomely fitted up in ſilver; all which, not only the glaſſes, but the Apparatus for managing them, were made by M. Leewenhoeck himſelf. Each microſcope had an object placed before it, and the whole was accompanied with a regiſter of the ſame in his own hand-writing, as being deſirous the gentlemen of the ſociety ſhould be enabled without trouble to examine ſeveral of thoſe objects on which he had made the moſt conſiderable diſcoveries, and which he thought in a particular manner deſerved their attention. Amongſt theſe objects are ſome globules of blood *; the eye of a gnat; ſmall pipes, which compoſe the tooth of an elephant; part of the

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* The blood, when viewed by a microſcope, appears to conſiſt of little red globules, ſwimming in an aqueous liquor, ſuppoſed to be the Cruor and Serum, which ſeparate after emiſſion. M. Leewenhoeck computes theſe globules to be twenty-five thouſand times ſmaller than the ſmalleſt grains of ſand, and Dr. Jurin makes them ſtill leſs. Upon an accurate menſuration he found the diameter of one of them equal to $\frac{1}{3240}$ part of an inch, or leſs than $\frac{1}{324}$ of an ordinary hair of the head.—Dr. Drake thinks the parts of the blood are not naturally globular, though its rapid motion may make it appear ſo: and Dr. Adams obſerved with his microſcope, that the blood, immediately after emiſſion, is ſo far from exhibiting any red globules, that it appears to conſiſt of infinite branches running confuſedly together, and variouſly coloured.

cryſtalline humour from the eye of a whale; the inſtruments from whence a ſpider ſpins the threads that compoſe its web*; the Animalcula in Semine maſculino of a lamb, taken from the teſticle; a bunch of hair from the inſect called a hair-worm; the double ſilk ſpun by the worm; the eye of a fly; and ſeveral other ſubjects proper for microſcopical obſervations.

It would be endleſs to enter into a detail of what is to be obſerved in theſe objects, or to give a full account of M. Leewenhoeck's diſcoveries; they are ſo numerous, as to make up a conſiderable part of the Philoſophical Tranſactions, and when collected together fill four volumes in quarto, which were publiſhed by himſelf at different times; and are of ſuch conſequence, as to have opened new ſcenes in ſome parts of natural philoſophy, particularly that famous diſcovery of Animalcula in Semine maſculino, which has given a quite different turn to the theory of generation, in moſt authors who have ſince written upon that ſubject *. By way of note, however, we have juſt

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* M. Leewenhoeck having diſſected the body of the largeſt ſpider he could find, and nicely examined each part, at laſt diſcovered the vaſt number of inſtruments from whence the ſpider draws threads of various fineneſs, which he judged to be at leaſt four hundred, lying not cloſe together, but in ſeveral diſtinct cluſters. Another time this gentleman took a ſpider, and laid it upon its back ſo that it could not ſtir, and then pulled out with a very fine pair of pincers a thread that he perceived ſticking out of one of the working inſtruments. At the ſame time he ſaw a great many very fine threads iſſuing out of its body, which, at the diſtance of a hair's-breadth or two from the body, were joined together and made thick threads. Some of theſe threads were ſo extremely fine, as almoſt to eſcape his ſight, though he made uſe of his beſt glaſſes. Hence it appears, that the threads of a ſpider's web, which to the naked eye ſeem to be ſingle, do really conſiſt of ſeveral threads; ſome of which, even ſuppoſing the ſpider full-grown, are ſo exceeding fine, that M. Leewenhoeck thought a hundred of them put together would not make a hundredth part of the thickneſs of a hair of his head. Ten thouſand, therefore, of the fine threads of a full-grown ſpider are not ſo thick as a hair; and if we add to this, what is really true, that four hundred young ſpiders, when they firſt begin to ſpin, are not, one with another, bigger than a full-grown one, and that each of thoſe ſpiders are provided with all the inſtruments of the old one, it will follow, that the ſmalleſt thread of a young ſpider is four hundred times ſmaller than that of a great one; and if ſo, then four millions of ſuch threads are not ſo thick as a hair of a man's head; which is a fineneſs quite aſtoniſhing, and beyond our conception.

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* There are two principal theories or methods of accounting for the generation of animals. The one ſuppoſes the Embryo or Foetus to be originally in the ſeed of the male; the other in the Ovum or egg of the female. The firſt ſuppoſes animalcules in the male ſeed to be the rudiments of the Foetus, and that the female only furniſhes them with a proper Nidus and nouriſhment; the ſecond ſuppoſes the firſt rudiments of the animal to be in the Ova, which the male ſeed only ſerves to warm, cheriſh, and ripen in the ovary. Each of theſe ſyſtems has its advocates, and plauſible arguments on its ſide; but it is not our buſineſs to enter into the diſpute. We have only to obſerve, that M. Leewenhoeck was the firſt diſcoverer of thoſe innumerable animalcules which are found floating in Semine maſculino, not only of the human ſpecies, but of beaſts, birds, fiſhes, and inſects; and though his doctrine met with conſiderable oppoſition, it ſeems now pretty generally received. Not to mention other reaſons, the generation of animals ab Animalculo is ſcarce to be doubted, if we conſider the analogy between plants and animals. All vegetables are produced in the like manner; for the ſeed of every plant is nothing but a little plant of the ſame kind, folded up in coats and membranes, which being thrown into the earth, as into its Uterus, ſpreads forth its roots, and receives from thence its nouriſhment: and therefore we may reaſonably ſuppoſe, that ſo curiouſly an organized creature as an animal proceeds from an animalcule of the ſame kind, and has all its little members folded up according to their ſeveral joints and plicatures, which are afterwards

juſt mentioned a few of that gentleman's obſervations, which we are perſuaded will not be diſagreeable to the curious.

As to the ſtructure of theſe inſtruments, it is the ſame in them all, and the Apparatus is very ſimple and convenient. They are all ſingle microſcopes, conſiſting each of a very ſmall double-

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wards enlarged and diſtended.—But to give an inſtance or two of M. Leewenhoeck's obſervations on the Semen of male animals. Having examined the ſeed of two young cocks newly killed, he found it full of animalcules with very ſmall tails, for the moſt part folded, and their bodies ſeemed crooked or circular. He afterwards took a cock that had been killed and plucked the day before, and having ſqueezed out a drop of the ſeed, and put it immediately before his microſcope, he could ſee legions of thoſe animalcules ſwimming together and croſſing each other, and as lively as if the cock had been newly killed; but taking out a little more of the ſeed about twelve hours after, he could not perceive any of them living. M. Leewenhoeck had often ſqueezed out of the hinder part of the bodies of male ſpiders a little white matter, about the bigneſs of a grain of ſand, which he was fully perſuaded was the ſeed of thoſe animals; and having accordingly examined it with his microſcope, he diſcovered therein a vaſt number of animalcules, which continued alive a conſiderable time. They were ſo extremely ſmall, that he ſuppoſed 1,000,000,000 of them joined together would not be equal to a barley-corn in bigneſs; and by reaſon of their exceeding ſmallneſs he could not poſſibly repreſent the exact figure of their bodies, nor of the inſtruments wherewith they moved ſo ſtrongly, as to continue living above five hours after they were ſeparated from the ſpiders.—In ſhort, the microſcope diſcovers millions of animalcules not only in the ſeed of animals, but in moſt liquors, as in water, wine, vinegar, beer, brandy, ſpittle, urine, dew, &c. alſo in infuſions of pepper, bay-berries, oats, barley, wheat, &c. In pepper-water particularly they have been obſerved almoſt incredibly minute, appearing to the greateſt magnifiers not ſo big as a mite does to the naked eye; inſomuch, that the obſerver computed, that if a hair of the head was ſplit into more than 7800 equal fibres, each fibre would be as thick as one of thoſe little animals.—On this ſubject ſee the Philoſ. Tranſ. paſſim.

convex glaſs ſet into a ſocket between two ſilver plates, rivetted together and pierced with a ſmall hole. The object is placed on a ſilver point or needle, which by means of ſcrews of the ſame metal may be turned about, raiſed or depreſſed, and brought nearer or removed farther from the glaſs, as the eye of the obſerver, the nature of the object, and the convenient examination of its ſeveral parts may require. If the objects were ſolid, M. Leewenhoeck fixed them to this ſilver point with glue; but if fluid, or of ſuch a nature as not to be commodiouſly viewed unleſs ſpread upon glaſs, he firſt fitted them on a little plate of talc, or very thin blown glaſs, which he then glued to the needle. For viewing the circulation of the blood, and ſome other obſervations, he had a different Apparatus.

THE glaſſes of theſe microſcopes are all exceeding clear, and ſhew the object very bright and diſtinct; which is undoubtedly owing to M. Leewenhoeck's great care in the choice of his glaſs, and his exactneſs in giving it the true figure. Their powers of magnifying are different, as may be requiſite for different ſorts of objects; but being all ground glaſſes, none of them are ſo ſmall, nor conſequently magnify to ſo great a degree, as ſome of thoſe little drops or ſpherules frequently uſed in other microſcopes: however, their diſtinctneſs much exceeds what is uſually met with in glaſſes of that ſort, which was the end M. Leewenhoeck principally aimed at; for though he had glaſſes by him of an extraordinary ſmallneſs for upwards of forty years, he made very little uſe of them, as having found, in a long courſe of experience, that the greateſt diſcoveries were to be made with ſuch glaſſes, as magnifying but moderately, exhibited the object with the moſt perfect brightneſs and diſtinctneſs.

There is another inſtrument ſaid to have been firſt contrived by Drebel, the Dutchman already mentioned, viz. a Thermometer, or what is popularly called a Weather-glaſs. As this inſtrument is deſigned to ſhew the various degrees of heat and cold by the elaſtic or expanſive power of fluid bodies, ſo divers methods and forms of conſtructing it have been thought of at different times; firſt Air, then Oil, then Spirit of Wine, and laſtly Quickſilver, having been every way applied in this experiment. The moſt common thermometer is that made with ſpirit of wine, whoſe ſtructure is as follows. A glaſs ball, fixed to the bottom of a narrow tube, is filled with rectified ſpirit of wine tinged with a little cochineal, and the top of the tube is hermetically ſealed by the flame of a lamp, which ſecures it from the preſſure of the air. Now, ſpirit of wine rarefying and condenſing very conſiderably, as the heat of the ambient air increaſes the ſpirit is dilated, and conſequently aſcends in the tube; and as the heat decreaſes the ſpirit is condenſed, and conſequently deſcends; ſo that the different degrees of heat and cold are known by the aſcent and deſcent of the liquor, being ſhewn by a graduated ſcale on the board to which the tube is affixed. The ball muſt be large in proportion to the bore of the tube; and that the heat or cold may ſooner penetrate the innermoſt parts of the liquor, the ball ſhould not be ſpherical, but oblong and flatted like a French flaſk.

The great defect of theſe and other thermometers is, that they are not reduced to one certain ſtandard, and therefore cannot be compared together. They mark indeed the different degrees of heat and cold; but each marks only for itſelf, and after its own manner, as not proceeding from any point of heat or cold that is common to them all. Nor can we be aſſured, that when the ſpirit is riſen a degree in two different thermometers, they have both ſuffered the impreſſion of an equal additional heat; ſince the ſpirit of wine may not be the ſame in both; and this ſpirit will riſe more or leſs by the ſame heat, in proportion as it is more or leſs rectified. On theſe and ſeveral other accounts the compariſon of thermometers is very precarious; and though various methods have been propoſed by various authors, for finding a fixed point, or degree of heat and cold, from which to reckon the other degrees and adjuſt the ſcale, that ſo obſervations made at the ſame or different times, in different places, may be compared together, the matter ſeems yet undetermined.

THERMOMETERS made with ſpirit of wine do well enough to ſhew the comparative heat of the air, but are not ſufficient for the purpoſe of the virtuoſo, who wants to explore the vaſtly different degrees of heat in other bodies, as boiling oils, melted metals, and even fire itſelf; for in ſuch degrees of heat the ſpirit will burſt the tube, and it will freeze when the cold is very intenſe, as the French philoſophers not long ago experienced in the Swediſh Lapland. Linſeed-oil, which requires four times the heat to make it boil that water does, was uſed by Sir Iſaac Newton inſtead of ſpirit of wine; but this being inſufficient for great degrees of heat, and likewiſe ſullying the tube, it has given way to the mercurial thermometer, which will ſuſtain any degree of heat or cold, as far as an inſtrument of this kind can be expected to do. This thermometer was contrived by M. Farenheit of Amſterdam, and is now come into general uſe; though it is allowed Sir Iſaac's was as well fitted as any for a ſtandard Weather-Thermometer, and for any degree of heat which the various ſtates of the human body exhibit; and alſo for thoſe different degrees which vegetation requires in a green-houſe, hot-bed, &c. In all which caſes, and many others, it is neceſſary to have one common, unerring, and univerſal meaſure, or ſtandard, which at all times, and in every place, will ſhew the ſame degree of heat by the ſame expanſion of the fluid.

After this account of the inventions of the Hollanders, it remains to take notice of ſome of their manufactures; amongſt which we ſcarce know of any more curious and uſeful than that of Paper *. This manufacture indeed is not peculiar

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* When and by whom Linen-Paper was invented is not known, as Polydore Virgil confeſſes. Scaliger aſcribes the invention to the Germans; Maffei to the Italians; others to ſome refugee Greeks at Baſil, who took the hint from the manner of making cotton-paper in their own country; and Conringius thinks we received it from the Arabs. Be this as it will, linen-paper appears to have been firſt introduced amongſt us towards the beginning of the fourteenth century, which agrees with the obſervations of Count Maffei, who finds no marks of its uſe before the year 1300. Some indeed go much farther back, and take the Libri lintei, mentioned by Livy and other Roman writers, to have been written on linen-paper; but this notion has been ſufficiently refuted. Others make the invention more modern than it really is, dating its origin about 300 years ago; but Mabillon ſhews the contrary, from many manuſcripts about 400 years old written on linen-paper; and Balbinus produces divers inſtances of ſuch manuſcripts written before the year 1340. Add to this, that in the Cotton library there are writings on paper in the times of moſt of our kings and queens, as high as the year 1335; and Dr. Prideaux aſſures us, he has ſeen a regiſtration of ſome acts of John Crandeſt, prior of Ely, made

peculiar to the Dutch, having now got footing in moſt parts of Europe; but France, Holland and Genoa, are the places where it has beſt ſucceeded. The Engliſh manufacture has grown into great reputation, and we now almoſt rival the Dutch in making paper, ſo that we import much leſs from Holland than formerly; and there are great hopes, from the improvement lately made in this buſineſs, that we ſhall ſhortly make as good paper at home as any part of Europe can produce. The method of manufacturing it is as follows.

THE linen rags (of which our European paper is made) being carried to the mill are firſt ſorted, then waſhed very clean in puncheons, whoſe ſides are grated with ſtrong wires, and the bottoms bored full of holes. After this they are fermented, that is, laid in ſquare heaps cloſe covered with ſacking till they ſweat and rot, which is commonly done in four or five days. When duly fermented they are twiſted into hand-

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made on paper, which bears date in the 14th year of king Edward II, that is, A. D. 1320. The invention, according to the learned doctor, ſeems to have been brought from the Eaſt, moſt of the old manuſcripts in Arabic and other oriental languages being written on this ſort of paper, ſome of which are certainly much older than any of the dates abovementioned. This author thinks it moſt probable, that the Saracens of Spain firſt brought it out of the Eaſt into that country, from whence it was propagated through the reſt of Europe.—As to the time of its being introduced into England, we read of a paper-mill erected at Dartford as early as the year 1588, which was probably the firſt, and is celebrated by Thomas Churchyard, a noted poet of that age, in a work in verſe, intitled, "A deſcription and diſcourſe of paper, and the benefits it brings; with the ſetting forth of a paper-mill built near Dartford, by a High German, called M. Spilman, jeweller to the queen. Lond. 1588, 4to."

fuls, cut ſmall, and thrown into oval mortars made of well-ſeaſoned oak, about half a yard deep, with an iron plate at bottom an inch thick, eight inches broad, and thirty inches long. In the middle is a waſhing-block, with fine holes in it, and a piece of hair-ſieve faſtened on the inſide, ſo that nothing can paſs out except dirty water. Theſe mortars are continually ſupplied with water by little troughs from a ciſtern filled by buckets faſtened to the floats of the great wheel, which raiſes the wooden hammers for pounding the rags in the mortars. When the rags are beaten to a certain degree called the firſt Stuff, the pulp is removed into preſſes, where it is left to mellow about a week; then it is put into clean mortars, pounded afreſh, and removed into preſſes or boxes as before, in which ſtate it is called the ſecond Stuff. The maſs being beaten a third time, till it reſembles flour and water without any lumps, it is thereby fitted for the pit-mortar, where it is perfectly diſſolved, and is then carried to the vat to be formed into paper. The vat is rightly primed, as they call it, when the liquor has ſuch a proportion of the pulp, as that the mould dipped into it will take up juſt enough to make a ſheet of paper of the thickneſs required. The mould is a ſquare ſieve about an inch deep, having a braſs-wire bottom, reſting on ſticks to prevent its bagging and keep it exactly horizontal. This mould the maker dips into the liquor, and gives it a ſhake as he takes it out to clear the water from the pulp. He then ſlides it along a grove to the coucher, who turns the ſheet, lays it on a felt, and returns the mould to the maker, who by this time has prepared a ſecond ſheet in another mould; and thus they proceed, laying alternately a ſheet and a felt, till they have made ſix quires of paper, which is called a Poſt. This quantity is then put under a preſs, and by the ſtrength of four or five men all the water is preſſed from it; after which it is ſeparated from the felts, laid regularly one ſheet upon another, and having undergone a ſecond preſſing it is hung up to dry. When ſufficiently dried it is taken off the lines, rubbed ſmooth with the hands, and laid by till ſized, which is the next operation. For this they chuſe a fine temperate day, and having boiled a proper quantity of clean parchment, or vellum ſhavings till they come to a ſize, they prepare a fine cloth, on which they ſtrew a due proportion of white vitriol and roch-alum finely powdered, and ſtrain the ſize through it into a large tub, wherein they dip as much paper at once as they can conveniently hold, and with a quick motion give every ſheet its ſhare of the ſize, which muſt be as hot as the hand can well bear it. After this it is preſſed, hung up ſheet by ſheet to dry, and then being ſorted it is told into quires, which are folded, preſſed very hard, and ſo tied up in reams or bundles for ſale.

THE manner of making Marbled Paper is ſo curious, that an account of it can hardly fail of being agreeable.—A trough is provided, either made of lead or wood well joined and pitched, of the ſhape and dimenſions of the paper to be marbled, and about four fingers deep, which is to contain the liquor uſed in the operation. This liquor is made by macerating a quantity of gum tragacanth four or five days in fair water, which is to be ſtirred from time to time, and freſh water daily added, till it be of a conſiſtence ſomewhat thinner than oil, and then it is ſtrained into the trough for uſe. The colours to be applied on the ſurface of this liquor, (which are uſually blue, red, green, and yellow) being prepared of proper ingredients, there is added to them a little ox or fiſh gall; and if the colours, when ſprinkled on the liquor, do not dilate themſelves ſufficiently, more gall muſt be added; but if they ſpread too much, the fault muſt be corrected by adding more of the colour. The colours being ranged in gallipots on the table where the trough is placed, they begin by dipping a bruſh of hog's hair into any colour, commonly the blue firſt, and ſprinkling it on the ſurface of the liquor; then the red is applied in the like manner, but with another bruſh; afterwards the yellow, and laſtly the green. When all the colours are thus floating on the liquor, they uſe a pointed ſtick, which being drawn with addreſs from one ſide of the trough to the other, ſtirs up the liquor and fluctuating colours; after which they draw a comb over the ſurface of the liquor, permitting only the teeth to enter; and this being performed with a gentle and uniform motion, makes thoſe clouds and undulations on which the beauty of the paper very much depends. The colours lying in this poſture; the operator applies on them a ſheet of white paper previouſly moiſtened, which requires a dexterity that can only be obtained by practice, the ſurface of the liquor and paper being to meet equally in all parts; which done, before the colours have time to ſoak through, he lifts it up nimbly, and ſpreads it on a board, where having lain a while it is hung upon a line to dry, and is then poliſhed with a marble-ſtone or knob of ivory. It muſt be obſerved, that the ſprinkling of the colours is to be renewed, and the other operations to be performed with the ſtick and comb, at every application of a freſh ſheet of paper, becauſe each ſheet takes off all the colours from the liquor.

THE city of Delft is famous for its manufacture of fine earthen-ware, which has of late years been well imitated and even equalled both by the French and Engliſh. Its beauty conſiſts, not only in the whiteneſs of the glazing, but in the lively colours and pretty deſigns with which they are painted, whether landſcapes, birds, flowers, or other ornaments. The white glazing is prepared of lead, tin, flint, and ſalt, which are firſt calcined, and then melted together into a cake; after which they are ground very fine, and tempered with water, ſo as to make them fit to be laid on the work. The blue painting is done with zaffre, which is brought from Saxony, where it is produced from a mineral called Cobalt; of which likewiſe is made the blue ſmalt uſed by painters, and ſeveral ſorts of arſenic or ratſbane.

THE woollen and linen manufactures were introduced into Holland by the perſecution raiſed in the Netherlands againſt the proteſtants in the reign of Philip the ſecond: and the wars between the French and Dutch obliged the latter to apply themſelves to the making of velvets, brocades, ribbands, lace, paper, &c. which they uſed to import from France. But nothing contributed more to bring theſe manufactures to a good degree of perfection in the United Provinces, than the number of French refugees, who fled from the perſecution raiſed againſt thoſe of the reformed religion in France, and were kindly received by the Dutch, as well as here in England. ——The woollen manufacture flouriſhes moſt at Leyden, where they make broad and narrow cloths, ſerges, camblets, druggets, &c. but inferior to thoſe of Britain, which they purchaſe to export to other nations.

At Haerlem they make the fineſt linen, and give it ſo beautiful a white, that linens are brought from the reſt of the provinces, and even from Germany and other countries, to be bleached there, for which the waters have a particular quality. In that city they alſo manufacture fine ſilks, flowered velvets, gold and ſilver brocades, and other rich ſtuffs; which, though inferior in goodneſs to thoſe of France and Italy, yet being cheaper find a quicker market.

At Amſterdam a great many hands are employed in all kinds of tapeſtry; and the number of mills in that city and its neighbourhood is ſurprizing, ſome for ſawing wood of all ſorts, others to work and poliſh marble; ſome to make gunpowder, others for grinding ſnuff, drawing oil from ſeed, and for various other purpoſes. In ſhort, one may apply to Amſterdam what Vopiſcus ſaid of Alexandria in Egypt, that "all its inhabitants are in ſome buſineſs, the lame and the blind have their employment, and even thoſe who have the gout in their hands are not permitted to be idle."

Our deſign does not require us to give an account of the foreign commerce of this opulent Republick, which indeed is a ſubject that would afford matter for ſeveral large volumes; and therefore we ſhall only juſt mention a few particulars.——The vaſt profit ariſing to the Dutch from the Herring-fiſhery may be gueſſed at from what we have already ſaid concerning it towards the beginning of this work *; and as to the Whale-fiſhery, they have been almoſt in the

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* See Vol. I. under the arts, manufactures and fiſheries of Great Britain.

ſole poſſeſſion of it for upwards of a hundred years, and it may at preſent be eſteemed one of the principal branches of their flouriſhing trade, as it annually employs near two hundred ſhips, from 250 to 400 tons. In their trade to the Baltic it is computed the Dutch employ a thouſand more ſhips than the Engliſh; but this is balanced by the number of ſhips we ſend to our Plantations in America, in which part of the world their commerce is not ſo conſiderable as formerly, their Weſt-India company being much decayed. Their Eaſt-India company carries on a very advantageous and extenſive commerce; and their trade to the Levant is not inconſiderable, though in this branch the Engliſh have undoubtedly the ſuperiority. We need ſay nothing of their commerce with France, Spain, Portugal, Great-Britain, and Ireland; for, in a word, the Dutch manage a prodigious trade in moſt of the known parts of the world, and are ſo induſtrious and numerous, that Holland may properly be compared to a large bee-hive, the multitude of ſhips continually going in and out repreſenting in a lively manner the ſwarm of bees, which bring into their ports the richeſt and beſt commodities of all nations.

CHAP. VII.

Of DENMARK *and* NORWAY.

WHIRLPOOLS, SPRINGS, MOUNTAINS, VOLCANOS, BRIDGES, and ROADS.

FROM the United Provinces we now proceed to take a view of what is moſt remarkable in the northern parts of Europe, beginning with the kingdoms of Denmark and Norway, and the iſlands thereunto belonging.

NEAR the coaſt of Norway, (in about latitude 68) it is ſaid there is a vaſt Whirlpool, commonly called Maelſtrom, or Moſkouſtrom, from the iſland of Moſkoe, near it, and by mariners the Navel of the ſea. Its violence exceeds that of a cataract, it being heard at a great diſtance, without any intermiſſion, except for a quarter of an hour, at the turn of high and low water, when its impetuoſity ſeems at a ſtand, and fiſhermen venture in: but this motion ſoon returns; and let the ſea be ever ſo calm, gradually increaſes with ſuch a draught and vertex, as abſorb whatever comes within their ſphere of action, keeping it for ſome hours under water, when the fragments ſhivered by the rocks appear again. This circumſtance makes ſeveral authors imagine, that here is an abyſs, which penetrates the globe, iſſuing in ſome very remote parts. But the learned biſhop of Pontoppidon obſerves, that there is no foundation for this conjecture; it having no other cauſe than the colliſion of the waves, riſing and falling at the flux and reflux againſt a ridge of rocks and ſhelves, which confine the water, ſo that it precipitates like a cataract; and thus the higher the flood riſes, the deeper muſt be the fall; the natural reſult of which is a whirlpool. Mr. Ramus is of the ſame opinion, and obſerves, that at the time of flood, the ſtreams run up the country, between the iſlands of Lofoden and Moſkoe, with a boiſterous rapidity; but the roar of its impetuous ebb to the ſea, is ſcarce equalled by the loudeſt and moſt dreadful cataracts, the noiſe being heard at the diſtance of ſeveral leagues. The whirlpool is then of ſuch extent and depth, that if a ſhip comes within its attraction, it is inevitably abſorbed, and daſhed to pieces againſt the rocks at the bottom. But when the ſtream is moſt boiſterous, and its fury heightened by a ſtorm, it is dangerous to come within one Norway, or ſix Engliſh miles of it; ſhips, boats, and yachts, having been carried away by not guarding againſt it, before it was too late. It frequently happens that even whales, coming too near the ſtream, are overpowered by its violence; and then it is impoſſible to deſcribe their bellowings in their fruitleſs ſtruggles to diſengage themſelves. A bear once attempting to ſwim to the iſland of Moſkoe, in order to prey on the ſheep feeding on the iſland, afforded the like ſpectacle to the people; for the ſtream caught him, and bore him down, while he roared ſo terribly, as to be heard on ſhore. It is remarkable that large firs and pine trees, after being abſorbed by the current, riſe again with their trunks broken and torn to ſuch a degree, that they ſeem as if covered with briſtles.

THE account we have of the whirlpool about the iſlands of Ferro or Farro, which belong to the crown of Denmark, given us by Mr. Jacobſon Debes, provoſt of the churches in thoſe iſlands, is alſo very extraordinary. The moſt dangerous is that which lies ſouth of Suderoe, near a rock called the Monk, where ſeveral veſſels have been ſwallowed up. The ſea round this whirlpool is eighty or ninety fathoms deep, and the ſurface of the water is ſmooth and ſtill; but a little farther in, the ground lies at the depth of twenty-five or thirty fathoms, where the ſea begins to riſe and turn round. Within this the ground lies from eight to ten or twelve fathoms deep, in four circles; and this high ground riſes up in points or clifts, which are about eight fathoms under water, and about twelve diſtant from each other. Between theſe circles are three channels from twenty-five to thirty fathoms deep, wherein the ſea runs round; and within all the circles there is a hole, the depth of which in the middle is above ſixty fathoms. The innermoſt current turns round but ſlowly, but the others with great ſwiftneſs. On the ſouth ſide of this hole the rock called the Monk riſes ten fathoms above water, and north of this there are ſix leſſer rocks, on the top of which, our author obſerves, the compaſs runs round like the whirlpool. Conſidering the danger that veſſels run by approaching this vortex, the reader perhaps may wonder how ſo particular a deſcription of it could be taken; but our author informs us, that in very calm weather, during the reflux of the ſea, the inhabitants venture to fiſh there, and to climb the rocks.

ICELAND, a large iſland in the northern ſea, that received its name from its exceſſive coldneſs, and the immenſe flakes of ice near it, is remarkable for its hot ſprings and volcanos; and as this iſland is ſubject to Denmark, we ſhall give them a place here. About Mount Hecla are ſeveral ſmall baſons, which ſometimes emit a copious ſteam. Theſe ſprings are of three ſorts; ſome are a little more than tepid, ſo that a perſon may hold his hand in the water, without any inconvenience: others are ſo hot, as to riſe in ſmall bubbles, like water ſimmering over a fire; but in others the ebullition is ſo ſtrong, as to force the water up to a conſiderable height. It is remarkable, that in a diſtrict named Reyker-Harbour, are three hot ſprings, at the diſtance of about thirty fathom from each, which bubble up alternately; and this ebullition generally happens in each of them about three times in a quarter of an hour. Tho' they lie in a plain, they riſe from a hard ſtony bottom, where two of them eject the water from the interſtices between the ſtones, about a yard in height; but in the bottom of the third, is a round aperture, through which, in its turn, it throws the water about five or ſix yards high. After this it ſubſides about two yards; and during that interval, one may go down and take a ſurvey of this wonderful ſpring. Its ebullition has three gradations: during the firſt, the water riſes half way up the cavity; afterwards it fills to the top, and the third time ſhoots up to the above-mentioned height. When the water is ſubſiding, it abſorbs any light ſubſtance, as a piece of wood; but at the return of the ebullition, caſts out even the heavy ſtones thrown into it.

A SPRING in a valley named Hacadal, riſes from a hollow rock, at the foot of a mountain; and Mr. Olave, who ſaw it in 1746, ſays the cavity is about twenty fathoms in circumference, and three in depth. There is a ſmall aperture at the bottom, through which the water generally riſes, till it runs over the baſon: then follows a terrible noiſe, like the diſcharge of ſmall arms, which ſhakes the very rock. After this noiſe has been repeated four or five times, the water, which is hot, emits a thick ſteam, like ſmoak, is violently agitated, and ſprings up to the height of ſixty fathoms, in ſuch quantities, as to form ſeveral hot rivulets on every ſide of the rock. The riſing and violent agitation of the water ceaſes in ſix or ſeven minutes, and the cavity or baſon becomes empty. This aſtoniſhing phænomenon happens once a day, and is periodical, returning at a certain hour: but whether the agitations of this ſpring correſpond with the tides in the neighbouring ſea, has not yet been determined.

THE inhabitants, who live near ſeveral of theſe hot ſprings, boil their victuals only by hanging a pot, in which the fleſh is put in cold water, in the water of the ſpring. They alſo bathe in the rivulets that run from them, which by degrees become lukewarm, or are cooled by their mixing with rivulets of cold water. It is ſaid, that the cows that drink of theſe ſprings yield an extraordinary quantity of milk; and the water is likewiſe eſteemed very wholeſome when drank by the human ſpecies.

ICELAND properly conſiſts of a prodigious range of mountains running from eaſt to weſt, ſeveral of which are always covered with ice and ſnow. In the vallies between them the inhabitants live, and in thoſe near the coaſt are plains covered with verdure: but notwithſtanding the amazing coldneſs of this iſland, earthquakes and volcanos are more known there, than in many countries in much warmer climates. The former have ſeveral times laid the country deſolate, particularly in 1734, 1752, and 1755, when fiery eruptions broke out of the earth. Many of the ſnowy mountains have alſo gradually become volcanos. The moſt famous of theſe burning mountains is Hecla, which is ſeated in the ſouth-eaſt part of the iſland, not far from the ſea; and has frequently ſent forth flames and a torrent of burning matter, whence the inhabitants formerly imagined, that this was the place where the ſouls of the damned are tormented. Its eruptions have been very frequent, eſpecially in 1693, when they were moſt dreadful, and occaſioned terrible devaſtations, the aſhes being thrown all round the iſland, to the diſtance of a hundred and eighty Engliſh miles; but ſince that time, Hecla is ſaid to have been free from eruptions. It takes up four hours to aſcend from the foot of this mountain to its ſummit; and on the north-weſt ſide is a vaſt chaſm, reaching from the top almoſt to the bottom. It is remarkable, that while flames and ignited matter iſſued from this chaſm, the huge maſſes of ice and ſnow, with which the other ſide of the mountain was covered, were not melted, though the heat on that ſide was ſo intenſe, as to calcine large ſtones and other ſubſtances.

BUT though the eruptions of Hecla have for a conſiderable time been ſtopped, others have ſince broke out. The huge mountain of Crabla on the ſeventeenth of May 1724, began to eject, in a terrible manner, ſmoke, fire, cinders, and ſtones, which were followed by a fiery ſtream, like melted metal. The lava continued to move ſlowly on for about eight or nine miles, as far as the lake of Mynat, into which it diſcharged itſelf, but did not ceaſe till the end of September 1729, when the eruptions of the mountain ſubſided. They were, however, ſoon followed by the eruption of three of the adjacent mountains: indeed it is a common obſervation among the inhabitants, that when the ice and ſnow are ſo accumulated on one of the mountains that formerly ejected fire, as to ſtop the clefts and chaſms, which were the ſpiracles whence proceeded ſmoke and flame, a new eruption is not far diſtant: thus in 1756, a mountain named Cotligian, which had twice before caſt forth fire and ſmoke, again began to flame.

BUT to return to Norway, which is alſo extremely mountainous. Here it muſt be obſerved, that the multitude of ſprings that iſſue from the mountains, and the vaſt maſſes of ſnow accumulated on their tops, which gently diſſolve in ſummer, form many lakes, in ſome of which are floating iſlands, and a conſiderable number of rivers, none of which are navigable far up the country: the paſſage being every where interrupted by rocks, and in ſome places, by dreadful cataracts, in which the ſtream precipitates itſelf from the height of forty, fifty, and even a hundred fathoms.

The bridges over theſe rivers are not walled; and are only formed on wooden caſes, filled with ſtones, which ſerve for the piers, on which the timbers are laid. The largeſt bridge of this kind has forty ſtone caſes, and is a hundred paces in length. But where the narrowneſs and rapidity of the current will not admit of ſinking theſe caſes, thick maſts are laid on each ſide, on the ſhore, with the thickeſt end faſtened to the rocks: one maſt being thus laid in the water, another is placed upon it, reaching a fathom beyond it; and then a third or fourth in like manner, to the middle of the ſtream, where it is joined by other connected maſts from the oppoſite ſide. Hence in paſſing over the bridge, eſpecially in the middle, it ſeems to ſwing, which to thoſe unuſed to theſe bridges, appears extremely dangerous; ſo that filled with terror, they alight from their horſes, and lead them over.

In ſome parts of Norway, the houſes of the peaſants ſtand ſo high on the top of ſteep precipices, that ladders are fixed, to climb up to them; ſo that when a clergyman is ſent for, he riſques his life in aſcending them, eſpecially in winter, when the ways are ſlippery. In ſuch places the bodies of the dead are let down with ropes, or brought down on a man's back, before they are laid in a coffin.

ONE of the principal inconveniencies experienced by travellers, ariſes from the roads; for they cannot, without terror, paſs even the king's road, which in ſome place extends up the ſides of ſteep and craggy mountains, on ways that are either ſhoared up, or ſuſpended by iron bolts fixed in the rocks; and though not above the breadth of a foot-path, have no rails on the ſide.

THE mountains of Norway are however attended with ſome advantages; a great chain of them ſerves as a barrier between this country and Sweden; and beſides exhibits the moſt delightful proſpects; for here nature has added greater beauties to the ſituation of cottages and farm-houſes, than in other countries, can be enjoyed by royal palaces, though aſſiſted by all the varieties of groves, terraces, canals, and caſcades. A predeceſſor of mine, ſays Dr. Pontoppidan, is ſaid to have given the name of northern Italy to the diſtrict of Waas; and certainly there cannot be a more enchanting proſpect. All the buildings in it are the church, the parſonage, and a few farm-houſes ſcattered on different eminencies. The beauty of the place is much heightened by two uniform mountains, gradually riſing to a vaſt height, between which runs a valley, near half a league broad, and a river, which ſometimes precipitates itſelf down the rocks in foaming cataracts; and at others ſpreads itſelf into ſmall lakes. On both ſides, it is bordered with the fineſt meadows, intermingled with little thickets; and by the eaſy declivities of the verdant mountains, covered with fruitful fields and farm-houſes ſtanding above each other, in a ſucceſſion of natural terraces. Between theſe a ſtately foreſt preſents itſelf to your view; and beyond that, the ſummits of the mountains covered with perpetual ſnow, and ten or twelve ſtreams iſſuing from the ſnowy mountains, form an agreeable contraſt in their meandars, along the blooming ſides of the hills, till they loſe themſelves in the rivers beneath.

We ought not to quit the country of Norway without mentioning, that near Roſtadt is a flat and naked field, on which no vegetable will grow. The ſoil is almoſt white, with grey ſtripes, and has ſomewhat ſo peculiarly poiſonous in its nature, that though all other animals may ſafely paſs over it, a goat or kid, no ſooner ſets its foot upon it, than it drops down, ſtretches out its legs, its tongue hangs out of its mouth, and if it has not immediate aſſiſtance, expires.

Fossils and Minerals.

WITHIN the bowels of ſome of the mountains in Norway, are various kinds of beautiful marble, ſome veined with blue, others variegated with a variety of colours, and others white: there are alſo green marble with greyiſh veins, blue marble with white veins, and black marble ſpotted with white. They likewiſe yield the Aſbaſtos, of which incombuſtible linen and paper have been made, of which we have already given a particular account; and ſuch quantities of the magnet, or loadſtone, that ſome tons of them have been exported.

It is remarkable, that though this country abounds in ſtone, no flints have yet been found there; ſo that thoſe uſed for fire-arms, are imported from Denmark or Germany: there are, however, amethyſts, garnets, chalcedonies, agate, aſper and cryſtals.

It will be proper here to mention Iceland Cryſtal, ſo called, as being found in Iceland in great abundance. This is a pellucid fiſſile ſtone, chiefly dug out of the mountains of Iceland *, though likewiſe to be met with in France and Germany. Its form is very regular, being always an oblique parallelopiped compoſed of ſix planes; but its ſizes are various, from a quarter of an inch to three inches in diameter, though its moſt uſual ſtandard is about two inches and a half. It is uſually found in ſingle maſſes, except in Iceland, where it is ſometimes found in complex maſſes of a great breadth; but theſe are evidently made up of a number of the perfect ſingle ſpecimens, placed ſide by ſide in a beautiful and orderly arrangement. This ſtone has a ſingular property, of ſplitting with the ſame eaſe either horizontally or perpendicularly, which is owing to the regular figure, the ſmooth ſurface, and nice joining of the ſeveral ſmall concretions of which it is compoſed. Writers on optics have taken much notice of this ſtone, and its uſual phænomena have been accurately examined by Eraſmus, Bartholin, Huygens, and Sir Iſaac Newton; but neither its nature nor texture ſeems to have been perfectly underſtood, moſt writers having accounted it a cryſtal,

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[*] Eraſmus Bartholine informs us, that this kind of cryſtal is found in ſeveral parts of Iceland, but is chiefly dug out of a very high mountain, not far from the bay of Roerfiord, in 65 degrees of latitude, all whoſe outſide conſiſts of this ſubſtance. It is cut, he ſays, by iron tools into pieces of a cubic foot; and in ſome of its corners is found a harder matter, proper for cutting glaſs, and reſembling the figure of a diamond. He adds, that it is electrical, attracting ſtraws, feathers, &c. when heated by rubbing; but it is not ſo hard as to bear poliſhing.—See more in Phil. Tranſ. No. 67.

cryſtal, and Sir Iſaac a ſpecies of talc; whereas in reality it is a true and genuine ſpar, though in brightneſs it does not fall much ſhort of the pureſt cryſtal, being perfectly clear, and very ſeldom blemiſhed with flaws or ſpots, or ſtained with any other colour. The remarkable property of this body, for which it is ſo famous amongſt opticians, is its double Refraction; ſo that if it be laid over a black line drawn on a piece of paper, the line appears thro' it double, or two lines appear inſtead of one, both of the ſame ſtrength of colour and thickneſs, and running parallel to one another at a ſmall diſtance. This effect is beſt ſeen through the plain horizontal ſurfaces of the ſtone, and there are ſome angles in which it is not produced. If a ray of light fall on this ſtone either perpendicularly or obliquely, it is divided into two by means of the ſame double refraction; and the like is obſerved in rock-cryſtal, though in a leſs ſenſible degree.

THE ſame kind of ſtone is found in the iſles of Ferro, where they have likewiſe ſome talc, and two ſorts of ſalt-petre, but in no great quantity. On the ſea-ſhore they likewiſe find a ſort of tranſparent ſtones, ſo hard that one may write with them upon glaſs. Some are white with a ſmall mixture of blue, others yellow, and ſo well poliſhed that they ſerve to put in rings. They grow in the clifts of the rocks, from whence they are waſhed by the waves; but they are not much eſteemed, and are ſaid to loſe their colour when removed.

WITH reſpect to the minerals of Norway, it formerly produced gold, but the expence of working the mines and ſeparating the gold from the ore, being greater than the profits, they have been neglected. There are, however, ſilver mines which are ſo valuable, as to afford employment to ſeveral thouſand perſons. The richeſt of theſe mines are thoſe of Kongſberg, which were diſcovered in 1623. In 1751 forty ſhafts and twelve veins were wrought in the four reviers of this mine, in which three thouſand five hundred officers, artificers, and labourers, are uſually employed. The ore in this mine is found only in diſperſed ſtratas and interrupted veins. Theſe mines are in a mountain between Kongſberg and the river Jordal: ſome gold has been found amongſt the ſilver; and ſometimes pure ſilver has been dug out of it: but the ſilver ore is not, as was at firſt imagined, confined to that mountain, it extending its veins for ſome miles thro' the adjacent diſtricts, which is proved by the new mines, opened from time to time, and carried on very proſperouſly. One of the moſt rich and ancient of all the mines, is named Old God's Bleſſing; and has ſometimes, within a week, yielded ſeveral hundred pounds weight of rich ore.

THIS mine never fails to fill the beholder with amazement at its aſtoniſhing depth, which is no leſs than a hundred and eighty fathoms perpendicular; and the circumference at the bottom forms a clear of ſome hundred fathoms. Here the view of thirty or forty piles, burning on all ſides in this gloomy cavern, and continually fed, in order to mollify the ſtone in the proſecution of the mines, ſeems, according to the common idea, an image of hell; and the multitude of miners, covered with ſoot, and buſtling about in habits, according to their ſeveral employments, may well be imagined ſo many devils; eſpecially, when as a ſignal that a mine is going to be ſprung in this or that courſe, they roar aloud Berg-Livet! Berg-Livet! Take care of your lives.

The copper mines are likewiſe extremely rich, and employ great numbers: one of the moſt profitable minerals of this country is iron, ſeveral hundred thouſand quintals being annually exported, chiefly in bars. Here are alſo ſome lead mines, but none of tin or quickſilver.

ANIMALS.

IT will not be improper, in treating of the animals of Norway, to mention the horſes, which deſerve notice, on account of ſome ſingularities, which render them peculiarly fitted by Providence, for ſo mountainous a country. They are ſmall, and of greater uſe in riding, than in drawing; they have an eaſy pace, are full of ſpirit, and remarkably ſure footed: for when they mount or deſcend a ſteep rock on ſtones like ſteps, they firſt tread gently with one foot, to try if the ſtone they touch be faſt; and in this they muſt be left to themſelves, or the beſt rider will endanger his neck; but when they are to deſcend a very ſteep and ſlippery place, they, in a ſurprizing manner, draw their hind legs under them, and ſlide down; in which they perfectly agree with the horſes of Peru; ſo that one would be apt to imagine them of the ſame breed. The reverend author we have more than once quoted, takes notice, that they ſhew great courage in fighting with the wolves and bears; for when a horſe perceives any of theſe furious animals advancing towards him, and has a mare or gelding with him, this generous ſpirited animal places them behind him, and then attacks his antagoniſt, by ſtriking at him with his fore-feet, with ſuch dexterity and courage, that he commonly remains conqueror.

BESIDES the bears and wolves juſt mentioned, there are here the lynx; great numbers of black, red, and white foxes; the marten, which, with the former, is hunted for the ſake of its ſkin, as alſo the ermine and ſquirrel, both of which are ſhot with blunt arrows. The ſkin of the ermine is of a beautiful white, with a black ſpot on the tail. Theſe little animals run after mice like cats, and drag away what they catch, eſpecially eggs, of which they are very fond. Here are alſo beavers, otters, badgers, and hedgehogs.

ONE of the moſt extraordinary animals of Norway is the glutton, which receives its name from its voracious appetite. Thoſe of this country, in their ſhape and ſize, have ſome reſemblance to a long bodied dog with thick legs, ſharp claws and teeth. This colour is black, variegated with brown and yellowiſh ſtreaks. He has the boldneſs to attack every beaſt he can poſſibly conquer; and if he finds a carcaſs ſix times as big as himſelf, he will not leave it, while there is any left. When fully gorged, he is ſaid to preſs and ſqueeze himſelf between two trees that ſtand near together, and thus empties himſelf of what he had not time to digeſt. As his ſkin ſhines like damaſk, and is covered with ſoft hair, it is much valued, and well worth the huntſman's while to kill the animal, without injuring the ſkin, which is done by ſhooting him with a bow and blunt arrows.

THE moſt pernicious vermin of this country, is the little animal called the Lemming, between the ſize of a rat and a mouſe. It has a ſhort tail, turned up at the end, and the legs are ſo ſhort, that they ſcarce keep its belly from the ground. Theſe creatures have very ſoft hair, and are of different colours, particularly black, with brown and yellow ſtreaks, and ſome in ſpots. It is very remarkable, that about once or twice in every twenty years, they aſſemble from their ſecret abodes, in prodigious numbers, as the biſhop of Pontoppidan obſerves, like the meſſengers from heaven, to puniſh the neighbouring inhabitants. They proceed from Kolen's rock, which divides the Nordland manor from Sweden, and is held to be their peculiar native place, marching in vaſt numbers, through Nordland and Finmark, to the weſtern ocean; and other bodies of them, through Sweediſh Lapmark, to the Sinus Bothnicus, devouring all the graſs and vegetables in their way. They do this in a direct line, and going ſtrait forward, proceed into the rivers or the ſea; thus, if they meet with any river, they run in at one end, or ſide, and out again at the other, in order to keep their courſe. They carry their young with them on their backs, or in their mouths, and if they meet with peaſants who come to oppoſe them, they will ſtand undaunted, and bark at them like dogs. This evil is, however, of ſhort duration; for on entering the ſea, they ſwim as long as their ſtrength laſts, and then are drowned. If any are ſtopped in their courſe, and unable to reach the ſea, they are killed by the froſts of winter; and if any of theſe eſcape, moſt of them die as ſoon as they eat the new graſs. There is a ſpecies of theſe animals in Kamtſchatka, the moſt eaſtern extremity of Aſia.

Among the birds of Norway is the fiſh-eagle, which is of a large ſize, and of a light brown. It does not diſlike a dead carcaſe on ſhore, but it lives principally on fiſh, which it often takes from the others, and frequently ſeizes them on the ſurface of the water. When this bird flies out to ſea, in order to ſtrike a fiſh with his talons, he ſometimes lays hold of ſuch as are too ſtrong for him, particularly the fiſh here called the Quiete, whoſe high and prominent back makes him appear much leſs than he really is: when the eagle ſtrikes his talons into him, he cannot eaſily diſengage them, on account of their crookedneſs and length, in which caſe the fiſh drags him down with him; while the bird, making a miſerable cry, ſtrives to keep himſelf up, and works with his wings ſpread as long as poſſible, though in vain; for at laſt he muſt yield, and fall a prey to thoſe he intended to devour. Our author mentions another inſtance, in order to ſhew that this king of birds, as he is called, extends his attempts beyond his power. Near Bergen, an eagle ſtanding on the bank of a river, ſaw a large ſalmon as it were juſt under him; on which he inſtantly ſtruck one of his talons into the root of an elm near it, and partly hanging over the river, ſtruck the other into the ſalmon, which being large and ſtrong, ſwam away, and ſplit the eagle to his neck.

THERE is a large ſea bird called the Northern Diver, which is bigger than a gooſe, and has a long neck, the upper part of which is black; as are alſo the feet and the beak; but from the breaſt downwards, it is white. It has alſo ſome white feathers at the extremity of its wings and tail. The wings are ſo ſhort, that they can hardly riſe with them; and the legs ſtand ſo far backward, that they are leſs fit to walk than to ſwim, paddling along the water; whence they are ſeldom ſeen to come aſhore. It is ſaid they lay but two eggs, and that under their wings are two pretty deep holes, in each of which they hide an egg, and there hatch their young, as perfectly and with leſs trouble, than others do in neſts on ſhore.

THE parrot of Norway is ſomewhat larger than a pigeon, and is covered with black and white feathers; but its beak, which is hooked like that of a parrot, is ſtriped with yellow, red and black; and ſo ſharp, that when he bites any of the bird-catchers, he takes away a piece of fleſh. He has alſo very ſharp claws, with which, and his beak, he defends himſelf againſt the raven, holding it by the throat, and carrying it out to ſea, where he drowns it, before he loſes his hold. This bird builds his neſt in the clefts of the rocks, and alſo in a ſlanting hole in the ground, ſix or eight feet deep.

IN ſhort, there are ſuch incredible numbers of ſea and land fowl, near the rocks on the ſea ſhore, that they ſometimes obſcure the ſight of the heavens for many miles, out at ſea; ſo that one would imagine, that all the fowls in the univerſe were aſſembled in one place.

NORWAY is likewiſe as plentifully ſupplied with fiſh, as any country in the world; one of the moſt extraordinary of which is the Ink-fiſh, called by ſome the ſea-gnat, and is from nine inches to upwards of two feet in length. The head has two large eyes, and the mouth has ſome reſemblance to a bird's beak; over which are two long arms, or horns, each of which is octangular, and covered with ſmall round balls. At the back of the head are two of theſe horns, twice as long as the reſt, and broader towards the end. The body, which is almoſt round, reſembles a ſmall bag, and on each ſide of it are two ſkinny membranes, with which the animal can cover itſelf, aſſuming various forms, by the motion of this ſkin and its horns; but what is moſt extraordinary, the fore-part of the body is filled with a black fluid, which makes the fiſh appear of a blue colour, though the fluid is of a fine black, and may ſerve for writing ink. When theſe creatures are in danger, they diſcharge this liquid, which blackening the water all round them, they become inviſible to their purſuers, and thus make their eſcape. Thus, this otherwiſe helpleſs animal, is happily provided by the wiſe Creator, with a ſingular method of defending itſelf againſt its enemies.

IN the Norwegian and other northern ſeas there is frequently caught a large fiſh called a Narval or Sea-Unicorn, remarkable for its long tooth or horn, which very much reſembles ivory, but is generally more ſolid and ponderous. This fiſh is ſmooth like an eel, its colour white ſprinkled with black ſpots, and its eyes about the bigneſs of a ſixpence. It has two fleſhly fins, and a ſemicircular hole on the top of its head, from whence it ſpouts water like a whale, and (as ſome ſay) diſcharges its excrements. The horn or tooth of this animal grows ſtrait forwards from the middle of its upper jaw, and is curiouſly wreathed and terminates in a point. With this ſtrong weapon it dares attack the largeſt whale, and can ſtrike with ſuch violence as to pierce the ſide of a ſhip. Some imagine the chief uſe of this prominent tooth is to break the ice, but it ſeems rather deſigned for the defence of the animal, and to enable it to procure its food; for we are credibly informed of a whale caught on the coaſt of Greenland, into the belly of which a narval had ſtuck his tooth up to the mouth, and was ſucking the blood and humours.——What uſually paſſes amongſt us for the Unicorn's Horn, and is ſhewn for ſuch in collec-

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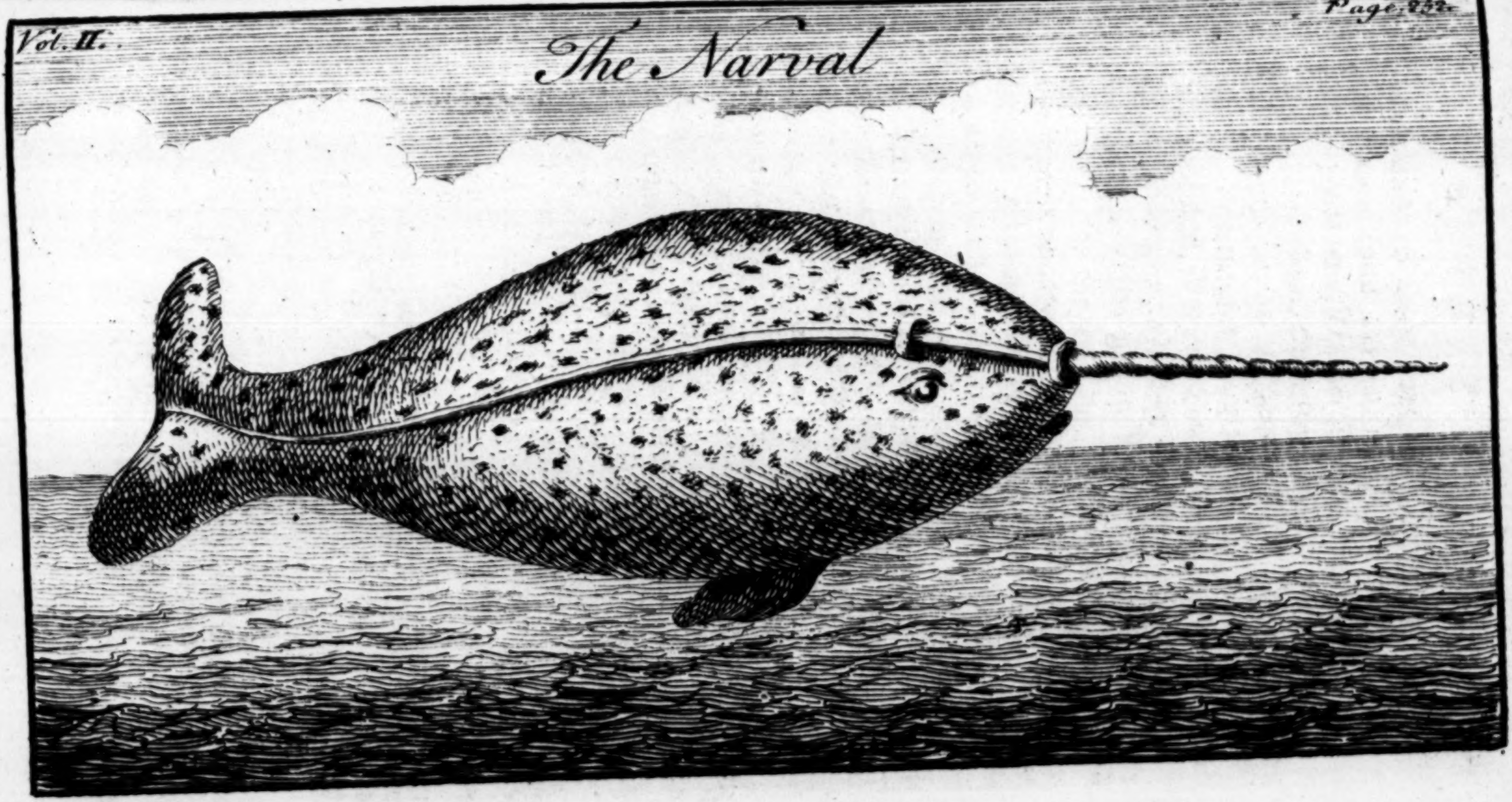

The Narval

collections of curioſities, is probably nothing elſe but the tooth of the narval *.

About the iſles of Ferro, according to Mr. Jacobſon Debes, there are great numbers of Seals or Sea-Calves, of different ſixes, ſome being as big as cows, and others not larger than a calf. This animal is amphibious, living either on land or in the water; and has four feet, the extremities whereof are like fins. They frequently ſleep on the rocks by the ſea-ſide, having always one upon the watch to alarm the reſt in caſe of danger. In September, when they bring forth their young, they retire into caves under the rocks, into which the natives row their boats, and kill multitudes of them with ſtaves, not without ſome danger from the old ones, as well as from the waves. The iſlanders ſometimes ſhoot them, and ſometimes take them with nets and dogs, which being trained to the ſport will ſwim to them againſt the wind, that the ſeals may not ſmell them, and catching them faſt by the throat, hold them till their maſters come up to their aſſiſtance.——The fleſh of the ſeal is ſtrong and but indifferent food, though the natives ſalt up part of it with the aſhes of ſea-weed, and melt the reſt for oil; and of their ſkins they make ſhoes and other wearing Apparel.

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* In the year 1736, a fiſh of this kind was taken in a creek of the Elbe in the dutchy of Bremen, about four miles from the ſea, whoſe horn was ſix feet three inches long; and the fiſh itſelf, from the root of the horn to the extremity of the tail, was ſeventeen feet ſix inches.——A fine horn of this ſort is preſerved in the repoſitory of St. Dennis at Paris, given by Andrew Thevet, and pretended to have been a preſent made to him by the king of Monomotapa, who carried him to hunt the unicorn. At Straſburg there is one above ſeven feet long; and at Venice there are ſeveral, all different from each other.

In the ſame ſeas there are ſeveral ſorts of whales, particularly one called the Grind Whale, the largeſt whereof are about five yards long, and come in great numbers under the land when the weather is dark or foggy. When any fiſhermen ſee them, they make ſigns to all the other boats, and thus getting together, they drive the fiſh into a creek or inlet, where they kill them with ſpears made for that purpoſe. The boats divide themſelves into two ſquadrons, one of which attacks the whales, and the other draws up in the form of a half-moon, to prevent their getting out of the creek; but in the ſkirmiſh the boats are ſometimes overturned, the men drowned, and the fiſh make their eſcape. Part of the fat of theſe Whales they uſe inſtead of butter, ſome they melt into oil, and the reſt of the fiſh they ſalt in the ſame manner as the ſeals, which makes their fleſh pretty much reſemble bacon.——Sometimes theſe fiſh are brought in with the tide, and run upon the ſhore in a dark night, where the people find them in the morning.

There is another ſort of whales called Doglins, about eight yards long, which come every year to a bay in the iſland of Suderoe, where the inhabitants drive them into an inlet, and kill them with ſpears. They are not ſo good meat as the former; for if a perſon eats their fat, it penetrates through the pores of his ſkin, and makes him ſmell ſtrong and look yellow.

Among the many ſorts of ſhell fiſh, one of the moſt curious is the ſea-urchin, known alſo by the name of the Sea-apple, which is very common on the coaſt of Norway, where they are ſeen every day. They are of various ſizes, from that of a wallnut, to the head of a new born infant; ſome are of the form of a cone, and others are quite round, except the hinder part, which is pretty flat, and of theſe are the greateſt number. The ſhell is covered with a multitude of ſmall ſharp prickles like ſmall pins, which they probably ſhed once a year, and have new ones. When they are juſt taken out of the ſea, they have a beautiful greeniſh luſtre; but their greateſt beauty appears when they are dried, boiled, and the prickles rubbed off. The ſhell then conſiſts in certain regular interchangeable ſtripes of a cylindrical form, running from the top to the bottom: ſome are white, others of an orange colour, others of a light red, and others of a deep red; and thoſe ſtripes are ſtrewed over with as many little white knobs as there were originally prickles. When this beautiful ſhell is broken, which is eaſily done, there is found in it a quantity of ſlime and water, with a ſmall fiſh, of a black or dark red colour; and from this little body there runs into all the turnings and windings of the ſhell a great number of fine threads, that ſeem only compoſed of a thicker ſlime, and have a communication with the external prickles; and between there is diſpoſed in ſtripes a yellowiſh ſpawn. The fiſh lies ſtretched from the bottom to the top of the ſhell, where there is an almoſt imperceptible opening, through which the excrements paſs. The mouth, which is extremely curious, is formed of five bones, part convex, and part concave, all running to a ſmall point, where they join together like the bill of a bird, and have ſome reſemblance to a flower. The ſea-urchin is found in a ſandy bottom, where he rolls himſelf about on his prickles wherever he pleaſes.

As we have already ſaid ſo much of the minerals and animals of Norway, we ſhall here give a conciſe account of the Norwegians, before we proceed to deſcribe the curioſities and buildings of Denmark.

The Cuſtoms and Manners of the NORWEGIANS.

THE Norwegians are generally tall of ſtature, well made, and in every reſpect appear a different people from the Laplanders, who lie farther to the north, and are of a ſmaller ſtature, and of a different complexion. The hair and eyes of the Norwegians are of a lighter colour than thoſe of moſt other nations, and a dark complexion is as uncommon here, as a fair one in Italy. They are generally briſk, active, and ſo ingenious, that the peaſants employ neither hat or ſhoemakers, weavers, taylors, tanners, ſmiths, carpenters, or joiners: theſe trades being all exerciſed in every farm-houſe; and they think a boy can neither be an uſeful member of ſociety, nor a good man, without becoming maſter of all theſe arts.

IT is remarkable, that the peaſants of one pariſh diſtinguiſh themſelves from thoſe of other pariſhes by their dreſs: thus thoſe of one pariſh wear white cloaths, edged with black; the dreſs of another pariſh is black, edged with yellow; and in others, they wear black, edged with red.

IN winter time, when they go on the rocks in the ſnow, they put on ſnow-ſhoes; but as theſe are troubleſome, when they have a great way to travel, they put on ſnow ſkates, which are as broad as the foot, but ſix or eight feet long, and pointed before; they are covered underneath with ſeal ſkins, ſo that the ſmooth grain of the hair turns backwards to the heel. With theſe ſnow ſkates they ſlide ſo faſt upon the ſnow, that no horſe can keep pace with them.

THE peaſants never wear any thing round the neck, except when dreſſed; for they always leave their neck and breaſt open, letting the ſnow beat into their boſoms: on the contrary, they wear a woollen fillet round their wriſts, to preſerve their veins from the cold. About their body over the coat, they have a broad leathern belt, adorned with convex braſs plates, to which hangs a braſs chain that holds their large knife, gimblet, and other tackle.

AT church, and in genteel aſſemblies, the women are dreſſed in cloſe jackets, and have leather girdles, ornamented with ſilver. They have alſo a ſilver chain, three or four times round the neck, with a gilt medal hanging at the end of it. Their caps and handkerchiefs are almoſt covered with ſmall ſilver, braſs and tin plates, buttons and rings, ſuch as they wear on their fingers; and to theſe they hang a number of ſmall ones, which, when they move, make a jingling noiſe. A maiden bride, has not only her hair platted, and hung as full as poſſible with theſe trinkets, but alſo her cloaths; and for this purpoſe they get all the ornaments of this kind they can procure.

THEIR houſes are uſually built of fir and pine trees; the whole trunks of which are only chopped even, to make them lie cloſe; being left round as they grow, both on the inſide and out; but are frequently boarded over and painted; and thus the thickneſs of the wooden walls, is a ſecurity againſt the piercing cold of winter. Their common farm-houſes have only the ground floor, and no other window but a ſquare hole in the wall, which in ſummer is left open; but in winter, or in wet weather, is cloſed with a wooden frame, covered with the inward membrane of ſome animal, which is ſtrong, and as tranſparent as a bladder.

The Norwegians are remarkable for their civility and hoſpitality; and are willing to do any one all the ſervice in their power. Hence a traveller is ſeldom permitted to pay for his lodging; for they think it their duty to treat a ſtranger as well as they can; and imagine, he does them an honour by excepting of their civilities. They keep open houſe at Chriſtmas, for three weeks, during which their tables are ſpread with the beſt proviſions they can afford. At Chriſtmas Eve, their hoſpitality extends even to the birds, for whoſe uſe they hang on a pole, at the barn door, an unthraſhed ſheaf of corn, which draws thither the ſmall birds.

Oat-cakes are their common bread, but at weddings, or other entertainments, they have rye bread. However, if grain be ſcarce, which it commonly is, after a very ſevere winter, they have recourſe to what, even they, eſteem a diſagreeable method of preſerving life, by boiling and drying the bark of the fir-tree, mixing it with a little oat-meal, and making it into a ſort of bread. They even eat a little of this in times of plenty, in order that they may think it the leſs diſagreeable, when neceſſity obliges them to make uſe of it. The beſt dainties of the Norway peaſants conſiſt in milk meats, and different ſorts of cheeſe, on which they ſpread butter, as on bread. Thoſe on the high lands are ſo fond of Angelica, that they chew it in a morning, and alſo make ſnuff of it. The mountains furniſh the people with game, and the lakes and rivers with plenty of freſh water fiſh. They kill cows, ſheep, and goats, for their winter ſtock, part of which they pickle and ſmoke; and ſome of it they cut in thin ſlices, ſprinkle it with ſalt, then dry it in the wind, and eat it like hung beef. They are fond of brandy, and of chewing and ſmoaking tobacco.

AGRICULTURE is in many places attended with great fatigue, the fields conſiſting of little ſpots of ground among the rocks, many of which muſt be dug, inſtead of being plowed; and in ſome places they uſe a crooked ſtick with an iron at the end, which yielding eaſily to the ſtones, is not readily broken.

IN the mountains which are covered with ſnow, and where horſes are of no ſervice, the peaſants do the work of thoſe animals, which they ſeem almoſt to equal in ſtrength. Our author has ſeen them thus labour in a profuſe ſweat, throwing themſelves every half hour upon the ſnow, for the ſake of its refreſhing coolneſs, and ſucking it to quench their thirſt. This they undergo without the leaſt apprehenſions of a cold or a fever, and without murmuring or betraying the leaſt diſcontent. On the contrary, they proceed ſinging merrily, and with incredible chearfulneſs and alacrity, endure the hardeſt labour for nine hours together.

ANOTHER diſadvantage is, that the peaſants often loſe their cows, ſheep, and goats, by their falling down the precipices, and being deſtroyed. Sometimes they make a falſe ſtep into what is called a mountain-hammer, from whence they can neither aſcend nor deſcend: on this occaſion a peaſant chearfully ventures his life for a ſheep or goat; deſcending from the top of a mountain, by a rope of ſome hundred fathoms in length, with his legs over a croſs ſtick, till he ſets his foot on the place, where he finds his goat, when faſtening it to the rope, it is drawn up along with himſelf. But the moſt amazing circumſtance is, his running this riſque, with the help of only a ſingle perſon, who holds the end of the rope, or faſtens it to a rock, if there be one at hand, proper for that purpoſe. There are inſtances, in which the aſſiſtant himſelf has been dragged down, and ſacrificed his life, from his fidelity to his friend, on which both have periſhed. When a man or beaſt has thus the misfortune to fall, ſome hundred fathoms down the precipices, it is obſerved, that the air preſſes with ſuch force againſt the bodies thus falling, that they are not only deprived of life for ſome time before they reach the ground, but their bellies burſt, and their entrails come out, which is plainly the caſe when they fall into deep water.

WE have already given an account of the adventurous method of catching birds, practiſed by the inhabitants of St. Kilda, we ſhall here give the manner in which this is performed by the Norwegians, which, tho' it reſembles the other, in ſome particulars, yet in others is ſo different, and ſo amazing, as to deſerve a full deſcription; though it is impoſſible to deſcribe the fatigue and danger with which this work is executed. The people, who are called Bird-men, have two methods of catching fowls: they either climb up the perpendicular rocks, or are let down from the top by a ſtrong and thick rope. When they climb up, they have a large pole of eleven or twelve ells in length, with an iron hook at the end. They who are underneath in a boat, or ſtand on a cliff, faſten this hook to the waiſtband of the man's breeches who climbs, by which means they help him up to the higheſt projection he can reach, and fix his feet upon. They then help up another to the ſame place, and when they are both up, give each his bird-pole, and a long rope which they tie at each end round their waiſts. The one then climbs up as high as he can, and where it is difficult, the other, by putting his pole under his breech, puſhes him up, till he gets to a good ſtanding-place. The uppermoſt of the two then helps the other up to him with the rope; and thus they proceed till they get to the part where the birds build, and there they ſearch for them. As they have many dangerous places ſtill to climb, one always ſeeks a convenient ſpot where he can ſtand ſecure by being able to hold himſelf faſt, while the other is climbing about. If the latter ſhould happen to ſlip he is held up by the other, who ſtands firm; and when he has paſſed in ſafety thoſe dangerous places, he fixes himſelf in the ſame manner, that he may enable the other to come ſafe to him; and then they clamber about after birds where they pleaſe. But ſometimes accidents happen; for if one does not ſtand firm, or is too weak to ſupport the other when he ſlips, they both fall and are killed; and every year ſome periſh in this manner.

Having thus reached the places that are ſeldom viſited, they find the birds ſo tame, that they may take them with their hands; they being unwilling to leave their young; but where they are wild, they throw a net over them in the rock, and entangle thoſe that are flying, with a net fixed to the end of their poles. Thus they catch a great number of fowls, and the boat keeping underneath them, they throw the dead birds into it, and ſoon fill the veſſel. If the weather continues favourable, and there be a great deal of game, the birdmen ſometimes continue eight days together on the rocks; where they find holes or caverns, in which they can ſecurely take their repoſe. In this caſe they draw up proviſions with lines, and boats are kept coming and going to carry away the game they have caught.

As many of the rocks are ſo ſteep and dangerous, that they cannot poſſibly climb up them, they are then let down from above; when they have a ſtrong rope eighty or a hundred fathoms long, and about three inches in thickneſs. One end of it the bird-man faſtens about his waiſt, and then drawing it between his legs, ſo that he can ſit on it, he is let down with his bird-pole in his hand, by ſix men at the top, who lets the rope ſink by degrees, but lays a piece of timber on the edge of the rock, for it to ſlide on, to prevent its being torn to pieces by the ſharp edge of the ſtones. Another line is faſtened round the man's waiſt, which he pulls to give ſigns when he would have them pull him up, let him lower, or keep him where he is. He is in great danger of the ſtones looſening by the rope, and falling upon him; he therefore wears a thick furred cap well lined, which ſecures him from the blows he may receive from ſmall ſtones; but if large ones fall, he is in the greateſt hazard of loſing his life. Thus do theſe poor men often expoſe themſelves to the moſt imminent dangers, meerly to get a ſubſiſtence for their families. There are ſome indeed who ſay there is no great hazard in it, after they are accuſtomed to it; but at firſt the rope turns round with them, till their heads are giddy, and they can do nothing to ſave themſelves. Thoſe who have learned the art make a play of it; they put their feet againſt the rock, throw themſelves ſeveral fathoms out, and puſh themſelves into what place they pleaſe. They even keep themſelves out on the line in the air, and catch with their poles numbers of birds flying out and into their holes. The greateſt art conſiſts in throwing themſelves out, ſo as to ſwing under the projection of a rock, where the birds gather together: here they fix their feet, looſen themſelves from the rope, and faſten it to a ſtone, to prevent its ſwinging out of their reach. When a man has done this, he climbs about, and catches the birds either with his hands or his pole, and when he has killed as many as he thinks proper, he ties them together, faſtens them to a ſmall line, and by a pull gives a ſign for thoſe above to draw them up. In this manner he works all day, and when he wants to go up, he either gives a ſignal to be drawn up, or, with his belt full of birds, works himſelf up with his hands and feet.

In caſe there are not people enough to hold the rope, the bird-man fixes a poſt in the ground, faſtens his rope to it, and ſlides down without any help. After which he goes to work as before. In ſome places there are ſteep clifts of a prodigious ſize lying under the land, and yet above two hundred yards above the water; theſe are likewiſe very difficult to be got at. Down theſe clifts they help one another in the above manner, and taking a ſtrong rope with them, faſten it here and there in the clift where they can, and leave it all the ſummer: upon this they will run up and down, and take the birds at pleaſure.

It is impoſſible to deſcribe how dreadful and dangerous this bird-catching appears to the beholders, from the vaſt height and exceſſive ſteepneſs of the rocks, many of which hang over the ſea. It ſeems impoſſible for men to enter the holes under theſe projections, or to walk an hundred fathoms high on crags of rocks, where they can but juſt fix their toes.

AFTER the birds are brought home, they eat part of them freſh, and part is hung up to dry for the winter ſeaſon. They afford the inhabitants a good maintainance, partly from their feathers, which are gathered and ſent to foreign parts, and partly from their fleſh and eggs; ſome ſorts of which are as good as hens eggs, and are ſent to market, though they are of various colours and ſizes.

MISCELLANEOUS CURIOSITIES.

WITHIN a few miles of Sleſwick are ſtill to be ſeen, in ſeveral places, the ruins of a famous wall which was built by the Danes to prevent the incurſions of the Saxons. It is thought to have been begun by Gothofred, King of Denmark, about the year 808, and to have been afterwards improved by Queen Thyra and other Daniſh monarchs. This rampart was called Danewark, and, like the Picts Wall in England, is reported to have reached from ſea to ſea, quite croſs that part of Jutland.

AT Hollen in Norway, about fifteen miles from Tonſberg, there is a remarkable church, which is cut out of a rock, and has a burying-place upon the top of it. It is undoubtedly very ancient, and perhaps, as Olaus Wormius ſuppoſes, was originally a heathen temple.

THE royal Muſeum at Copenhagen contains ſuch a noble collection of curioſities, both natural and artificial, that we apprehend a ſhort account of them will afford the reader an agreeable entertainment. Dr. Oliver informs us, that this fine collection is preſerved in eight chambers built over the royal library, which is large and well furniſhed. One of theſe rooms is wholly taken up with medals, antique and modern, each ſort being kept by themſelves, and very judiciouſly arranged; and in a ſeparate caſe are contained the Paduans *, and other counterfeit medals, which in workmanſhip ſo nearly reſemble the true Grecian and Roman antiques, that a good judge can ſcarce diſtinguiſh them from originals. The ſeries of the modern medals of European nations are abſolutely compleat, and thoſe of each nation kept diſtinctly.

AMONGST the natural curioſities preſerved in theſe chambers, one of the moſt remarkable is a petrified child, the hiſtory whereof has been given us at large by Bartholine, Licetus, and other authors. This Child was cut out of the mother's belly at Sens in Champagne, in the year 1582, after having lain there between twenty and thirty years; and that it is a human Fœtus, and not artificial, is evident beyond all diſpute. Its head, ſhoulders, and belly, are of a whitiſh colour, and very much reſemble alabaſter; the back and loins are ſomewhat brown and harder; but from the hips downwards it is of a red colour, and as hard and perfect ſtone as can be, exactly reſembling the hard ſort of ſtones generated in the bladder. This Fœtus, after it was taken from the mother, was firſt carried to Paris, where it was ſold to a

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* A Paduan, among medalliſts, is a modern medal, ſtruck with all the marks and characters of antiquity. The name is taken from a famous Italian painter, called the Paduan, from Padua the place of his birth, who ſucceeded ſo well in the cheat, that the beſt judges are at a loſs to diſtinguiſh his medals from thoſe which are really antique. His ſon Octavian, though born at Rome, was alſo called the Paduan.—Laurentius Parmeſanus and Bellus Vicentinus in Italy, and Carteron in Holland, had likewiſe the art of imitating antique medals in great perfection.

jeweller of Venice, who happened to be there, for about twenty pounds ſterling; of whom it was afterwards purchaſed by Frederick III. King of Denmark, for ſixty pounds, and added to this collection.

IN one of the chambers are to be ſeen two Elephant's Teeth, each weighing a hundred and fifty pounds, which were dug out of a ſtone-quarry in Saxony.—Here is alſo an egg laid by a woman, about the ſize of a common pullet's egg, which Olaus Wormius tells us was ſent him by very good hands, and the truth of the fact confirmed by people of credit. The woman, he ſays, brought forth two eggs, with the uſual child-birth pains: but the neighbours, who were called in to her aſſiſtance, broke the firſt, wherein they found a yolk and a white, as in that of a hen *. We likewiſe

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* As ſtrange as this may ſeem to thoſe who are unacquainted with the animal œconomy, we have abundant teſtimonies to confirm the truth of ſuch productions; and indeed the generation of all ſorts of animals ab ovo, from eggs, is ſtrenuouſly aſſerted by Harvey, de Graaf, and other great anatomiſts. M. Olivier, a phyſician at Breſt in France, atteſts, that in the year 1684, a woman who had been pregnant ſeven months was brought to bed of a whole plate full of eggs, faſtened together like a bunch of grapes, and of various ſizes, from that of a lentil to that of a pigeon's egg. Bonetus, in a letter to Zuingerus, mentions a young maid who had brought forth a great number of little eggs: and Virdungius relates, that in diſſecting a woman who had a rupture, he found eggs of divers ſizes in the Cornua of the womb. We meet with ſeveral inſtances of the ſame thing in Rhodius, and in the memoirs of the Curioſi Naturæ; inſomuch that Berger, in his treatiſe de Natura humana, gives it as his opinion, that the onlydifference between oviparous and viviparous animals conſiſts in this, that the former caſt their eggs out of the body, and lay them in neſts, and that their eggs contain all the nouriſhment requiſite for the Fœtus; whereas in the latter the eggs are only detached from the ovary

likewiſe ſee here an Unicorn's Horn, as it is called, white as ivory, and ſpirally twiſted. This, however, is not the horn of any land-animal, but belongs to a kind of whale called a Narval, of which we have juſt given a deſcription.

IN this fine collection there are ſeveral large pieces of ſilver ore, dug out of the mines of Norway in 1666, one of which weighs five hundred and ſixty pounds, and is valued at five thouſand crowns. Another piece, ſomewhat leſs, is valued at more than three thouſand; both being ſo rich, that they are reckoned to contain at leaſt three parts ſilver. They are compoſed of a whitiſh ſtone, the cracks or cavities whereof ſeem to be filled with pure virgin ſilver, which in ſome places lies in broad flat plates, and in others like pieces of fine ſilver-lace: but what is moſt admired in theſe pieces of ore, are the threads or branches of ſilver which ſhoot out an inch or two beyond the ſurface of the ſtone, appearing in the form of ſmall ſhrubs or buſhes; and ſeveral other ramifications of this kind are to be ſeen among the ſilver-ores preſerved in this Muſeum.

HERE are alſo found ſeveral large pieces of Amber, ſome weighing forty or fifty ounces; which, upon opening the ditches about Copenhagen, when they fortified the city, were found ſticking to the ſides of old trees that were buried there, like the gum on the plum-trees in our gardens.—In the ſame chamber are a great many large branches of white and red Coral, and one of black; likewiſe a pair of Stag's-Horns grow-

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ry into the Uterus, and have but little juice, the reſt being furniſhed by the mother.—On the other hand, we have inſtances of a crow, a hen, and other oviparous animals, producing their young alive and without eggs.

ing out of a piece of wood in a ſurprizing manner. —Here is a human Thigh-bone three feet three inches long, as meaſured by Dr. Oliver himſelf*;

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* Whether the bone here mentioned did really belong to ſome human body of a gigantic ſtature, or to ſome elephant or other large animal, we ſhall not pretend to determine; but Sir Hans Sloane obſerves in the Philoſophical Tranſactions (No. 404.) that ſeveral of thoſe bones and teeth, which are kept and ſhewn about for the bones and teeth of giants, have been found, upon accurate inſpection, to have belonged to elephants or whales; from whence he infers, that others alſo, which for want of a ſufficient deſcription cannot be ſo well accounted for, muſt probably have belonged to ſome of thoſe large creatures. The pretended ſkeletons of giants, which have been dug up from time to time, Sir Hans likewiſe takes to be the ſkeletons of elephants or other huge animals, as ſeveral of them have actually proved to be upon examination. Of this kind was the large ſkeleton found near Trapani in Sicily, two others near Tunis in Africa, another near Krembs in Auſtria, and many more that might be mentioned; for as to Strabo's ſkeleton of a giant ſixty cubits high, and that of Pliny forty-ſix cubits, they are undoubtedly fabulous.—Dr. Molyneux (Phil. Tranſ. No. 260.) deſcribing a large Os Frontis of a man preſerved in the anatomical ſchool at Leyden, argues ſtrenuouſly for the exiſtence of giants; for as there have been dwarfs in all ages and countries, which have fallen ſhort even of half the common ſtature of mankind, ſome being not thirty inches in height, the doctor thinks it not unreaſonable to imagine that nature may ſometimes act in the contrary extreme. Indeed, we have clear teſtimonies (ſays he) given us by authors of unqueſtionable credit and veracity, that there actually have been men in the world, and it is likely ſtill are, of ſuch a bulk and ſtature, as properly to deſerve the name of giants. Edmund Mallone, when his ſhoes were off, meaſured full ſeven feet ſeven inches in height; and Walter Parſons, porter to king James the Firſt, was much of the ſame ſtature. Diemerbroeck tells us, he ſaw at Utrecht a man eight feet and a half high; Becanus ſaw a man near ten feet, and a woman that was full ten feet in height; and Thevet, ſays he, was ſhewn by a Spaniſh merchant the ſkull and bones of an American giant, whoſe height was eleven feet five inches.

and two very large ſcollop-ſhells, holding about three gallons each, and weighing 224 pounds a-piece. Theſe were brought from the Eaſt Indies; and it is ſaid, the fiſh they belong to is of ſuch ſtrength, that if a man happens to get his arm or leg between the ſhells when they are open, it claps them together ſo forcibly as to cut the limb clear off.

A PIECE of marble is preſerved in this collection, which the Lutherans reckon a very valuable curioſity, the natural veins of the ſtone running in ſuch a manner, as to repreſent the exact figure of a crucifix. Some indeed have ſuſpected the repreſentation to have been by art; but upon the niceſt examination it appears to be entirely the work of nature *.—Having given a ſufficient ſpecimen

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inches.—Dr. Derham is of opinion, that though we read of giants before the flood, and more plainly after it, yet the common ſize of man was always the ſame from the creation, the giants ſpoken of in ſcripture being mentioned as rarities and wonders of the age, and not of the common ſtature. Inſtances of this kind we have had in all ages, beſides many fabulous relations, ſuch as we ſuppoſe that of Theutobocchus to be, who is ſaid to have been dug up in 1613, and to have been twenty-ſix feet high; and the ſtill more extravagant accounts of giants given us by Olaus Magnus. As for the inſtance of Goliah, whoſe height was ſix cubits and a ſpan, 1 Sam. xvii. 4. (which according to Biſhop Cumberland is ſomewhat more than eleven Engliſh feet) of Maximinus the Emperor, who was nine feet high, and ſeveral others about the ſame height; theſe are all to be matched, and even outdone, by modern examples, given us by Ludolphus, Magius, Conringius, Hakewill, and other authors.

* Repreſentations of this kind by the veins of ſtones, and perhaps with the help of a ſtrong imagination, are frequently to be met with, particularly in the Florentine marble, wherein various figures, eſpecially the ruins of old buildings, appear in a very natural manner. A remarkable inſtance of this nature is to be ſeen in an Egyptian pebble, now in the Britiſh Muſeum; from one end of which a lapidary having ſtruck off a ſmall piece, obſerved to his great ſur-

cimen of the natural rarities, let us now take a view of thoſe which are artificial.

AMONGST theſe there is a Skeleton made of ivory, two feet ſix inches high, in imitation of a human one; and it is ſo nicely formed and put together, that one might eaſily take it for a natural Skeleton. — There are likewiſe the whole hiſtory of our Saviour's Paſſion, beautifully expreſſed in a piece of carv'd work; a ſmall man of war in ivory, with ſilver guns; and a watch made of ivory, with all its wheels and movements. Beſides theſe, there are many other curioſities in ivory, ebony, box, amber, and other materials, which are kept for the ſake of the elegant workmanſhip: and we are told there is a common Cherry-ſtone, on the ſurface of which are engraven two hundred and twenty heads, but their ſmallneſs makes them appear imperfect and confuſed *.

IN this Royal Repoſitory we find ſix golden ſepulchral Urns, which were diſcovered in the iſland of Funen in 1685, by a peaſant, as he was ploughing his land, and contained each of them ſome aſhes of a greyiſh colour. The largeſt of

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ſurprize, that the courſe of the veins repreſented a human face, and not only ſo, but the face of a particular perſon. The lineaments (it ſeems) are exactly thoſe of our old poet Chaucer, according to all the paintings we have of him; and this has ſo little of fancy in it, that every one who ſees the ſtone, if he ever before ſaw a picture of Chaucer, muſt rememberthe likeneſs.

* Dr. Oliver tells us he did not ſee the cherry-ſtone here ſpoken of, but ſays, that in Holland an Engliſh gentleman once ſhewed him a cherry-ſtone with a hundred and twenty-four heads upon it, and all ſo perfect, that the naked eye might diſtinguiſh thoſe of kings, popes, cardinals, &c. by their crowns and mitres. This curioſity was bought in Pruſſia for three hundred pounds, and is ſaid to have been the workmanſhip of a poor wretch in priſon at Dantzick.

them weighs two ounces and a half, and the others two ounces and a dram. They are very thin, and each has three rings of gold about its neck, with ſeveral circles carved upon the outſide of the urn, having one common center. This diſcovery confirms the account given us by Olaus Wormius and other writers, that it was an ancient cuſtom among the northern nations to burn their dead, and then bury their collected aſhes in golden urns.—There is another ſepulchral urn of cryſtal, of a conical figure, which has alſo a gold ring about it, and was found near Bergen in Norway. —There are likewiſe in this collection ſeveral veſſels of different ſizes, ſome of glaſs, and others of earth, which are called Lachrymal Urns, or Lachrymatories, being uſed by the ancient Romans to catch the tears of weeping friends, which were afterwards mixed with the aſhes of the deceaſed.

We ſhall conclude our account of this celebrated Muſeum with a deſcription of the Daniſh and Oldenburg Horns, two curioſities which are much admired. The Daniſh horn is of pure gold, weighs a hundred and two ounces and a half, is two feet nine inches long, and holds about two quarts of wine meaſure. This horn was accidentally diſcovered in the year 1639, by a country girl, in the dioceſe of Ripen in Jutland; and is undoubtedly a piece of great antiquity, by the figures carved on the outſide, which ſeem to be hieroglyphics, devils, hobgoblins, &c. Perhaps ſome of theſe figures were deſigned to repreſent their deities, and the horn was probably uſed in ſacrifices, as among the ancient Aſſyrians, and other nations, who upon ſuch ſolemnities made a great noiſe with horns and trumpets, and uſed them to drink out of at their ſolemn entertainments.—

The Oldenburg horn, which is of pure ſilver gilt, weighs about four pounds, and is curiouſly enamelled with green and purple. The Daniſh antiquaries tell many fabulous ſtories of this horn, which are not worth repeating; and as to what they ſay of its being given to Otho, earl of Oldenburg in the year 989, it is plain it cannot be of that date, for the figures and characters on the outſide are modern; which however, with the enamelling and other ornaments, are of excellent workmanſhip, and make it a very fine and valuable curioſity.

BUILDINGS.

SEVERAL of the cities of Denmark and Norway, particularly Copenhagen, are adorned with handſome churches, ſome of Gothic, and others of modern architecture; but none of them are ſo extraordinary as to require a deſcription.— The cathedral of Roſchild, once the capital of Denmark and a biſhop's ſee, is an old but ſtately ſtructure, chiefly noted for being the burial-place of the royal family. Here are the tombs of many of the Daniſh kings, ſome of which are very magnificent; and over the altar is a fine piece of gilded carved-work, repreſenting the hiſtory of our Saviour's Paſſion.—The cathedral of Ripen is a noble pile, built with free-ſtone and covered with lead, and has a lofty ſquare ſteeple. The marble columns which ſupport its roof, and ſome royal tombs, are its principal ornaments. — We ſhall only mention one church more, viz. the cathedral of Aarhus, which is of curious architecture, and adorned with many fine monuments of prelates, noblemen, and other perſons of diſtinction.

As to the palaces of the king of Denmark, that at Copenhagen, having been deſtroyed by fire in

1728,

1728, has been rebuilt in a magnificent manner. In the neighbourhood of Copenhagen is alſo a magnificent royal palace, ſituated on a hill. This edifice is very ſpacious; on every ſide it makes a magnificent appearance, and has a fine proſpect. The garden, which lies below the hill, is very extenſive, and contains many pleaſant walks, a labyrinth, a theatre, ſeveral groves, with many ſtatues, fountains, and ſummer-houſes; and in the front of the palace is a fine caſcade. Two flights of broad ſtone ſteps lead from the palace into the garden, where is a menagery ſtocked with lions, tygers, and many other wild beaſts.

ABOUT five miles from Copenhagen is a royal palace, which was thought to have been finiſhed in 1739, tho' it has ever ſince been conſtantly receiving new improvements and embelliſhments. The outſide has a magnificent appearance, nor is it leſs elegant within. The great hall, which takes up the height of two ſtories, has a noble fountain, that throws a column of water above twenty feet high, which falls down again into a copper baſon. The chapel is elegant and well adorned; and at the extremity of the garden, which is very beautiful, is a noble ſummer-houſe; and on one ſide of it, an eminence covered with trees, on which is a houſe, built in the Norwegian taſte.

THE royal palace of Friedenſburg, is pleaſantly ſituated about nine miles from Cronenburg, and was compleated in 1720; when the treaty of peace being concluded with Sweden, the king gave it this name, Frieden ſignifying Peace. The inner court is a regular octagon, formed by ſeven wings, one ſtory high; and the main building, which is oppoſite the principal entrance. In the midſt of the court is a fountain, adorned with a marble ſtatue of Peace, made at Florence. The main building is in the form of a parallelogram, and covered with copper. The apartments are nobly furniſhed. The garden, though not very extenſive, is well laid out, and embelliſhed with ſtatues, vaſes, and other ornaments. It is encompaſſed by a large wood, in which is a menagery, ſtocked with a variety of beautiful tame, and wild fowl. This wood has ſeveral viſtas cut through it, and affords plenty of game. From the palace is a delightful proſpect, the eye commanding almoſt all the viſtas at once; and at the end of them is an extenſive lake, in which is a beautiful yacht.

THE palace of Frederickſburg is eſteemed the moſt beautiful and delightful of any belonging to his Daniſh majeſty, and is frequently called, The Verſailles of Denmark. It ſtands on an iſland in the middle of a lake of freſh water, and conſiſts of three principal parts, each encompaſſed with water, but joined together by bridges. The firſt diviſion, to which you arrive by paſſing a bridge, reſembles a horn-work, the front of which is quite round, and faced with ſtone, with ſeveral buildings on each ſide. In the ſecond diviſion, are magnificent buildings belonging to the noblemen of the court, and the king's kitchen. From thence a fine ſtone bridge leads to the grand portico of the chief entrance of the palace, which is built with free-ſtone, and adorned with ſculpture and gilding. The principal building conſiſts of a corps de Logis, and two wings, four ſtories high, covered with copper, and adorned with ſeveral towers; and both the wings are joined to the front by a low building of one ſtory. Upon the firſt entrance into the inner court, the magnificence of the ſtructures, the beauty of the marble, the elegance of the ſculpture, and the richneſs of the gilding, fill the beholder with aſtoniſhment; but what principally ſtrikes the eye, is a noble imitation of the ancient architecture, conſiſting of two grand arcades, one over the other, in the front of the building: theſe conſiſt of ſeven arches below, and as many above, built with free-ſtone, and embelliſhed with ſtatues, that ſtand either in niches, or detached from the wall; and in this court is a beautiful fountain. The gallery leading to the hall of audience is adorned with a fine collection of paintings, chiefly brought from Italy: and the hall is hung with the pictures of the Daniſh kings, and the preſent royal family, as large as the life. The exploits of ſome of theſe monarchs, are likewiſe beautifully painted in different parts of the palace, and the great actions of Charles IV. are repreſented in rich tapeſtry. In the church belonging to the palace, the eye is in a manner dazzled by the glittering of the gold, ſilver, and curious marble, with which it is embelliſhed. The altar is of black marble, the front of the table is of ſilver and ebony, and the pulpit of the ſame materials. From the gallery you have a view of the large pictures, with which the pilaſters between the windows are covered. This gallery leads to a ſpacious place behind the altar, where the royal throne is erected; and on the walls, which are hung with crimſon velvet, are the arms of all the knights of the order of the elephant. In ſhort, all the apartments of the palace are very magnificent. There is a fine garden behind it, and the neighbouring park, which is about nine miles long, is agreeably interſperſed with canals, fiſh-ponds, and a mixture of graſs plats, and little hills and vallies, well ſtocked with fallow deer from England.

THE caſtle of Gottorp, belonging to the duke of Holſtein, is at the ſame time a fortreſs, and one of the nobleſt palaces in theſe northern countries. It ſtands to the weſt of the river Sley, in the middle of a ſmall lake, and is built in the form of an oblong ſquare, and fortified with four baſtions of earth. A rampart encompaſſes the firſt court, and the gate of the caſtle is of a fine blue ſtone as hard as marble. On the north ſide of the caſtle there is a bridge over the lake two hundred paces in length, and at the end of the bridge a fine walk between rows of trees leads to the garden, which is adorned with caſcades, fountains, and other water-works. In particular there is a large baſon or fiſh-pond, with pleaſant arbours on the ſides of it, and in the middle is a ſtatue of Hercules combating the hydra, whoſe heads ſpout out water. On the north there is a parterre in form of a creſcent, divided into compartments, and embelliſhed with the buſts of ſeveral kings and princes. But one of the moſt curious ornaments of theſe gardens is a fine globe of copper, ten feet and a half in diameter, with a ſphere, exhibiting the motion of the ſun and heavenly bodies, which are carried round in exact order by means of certain wheels turned by water. Before the houſe there is a level piece of ground, about a hundred and fifty paces long, which is divided into three parts, thoſe on the ſides being two fine parterres, and that in the middle having a large baſon in the center with beautiful water-works. From hence we aſcend to different terraces, one above another, ſet round with ſtatues, buſts, and other ornaments. The higheſt terrace exhibits a moſt delightful proſpect, having the caſtle in the front, ſurrounded with a lake, (as we obſerved above) and a charming country which way ſoever we turn our eye. On the left there is a noble orangery or green-houſe; and the neighbouring park, which is four or five Engliſh miles in circumference, is full of deer, and in all reſpects one of the pleaſanteſt imaginable.

HERE we cannot forbear mentioning a very famous ſtructure, though long ago demoliſhed, which was built in the little iſland of Huen or Ween, lying in the Sound about half a league from the coaſt of Schonen, by that celebrated Daniſh aſtronomer Tycho Brahe. This iſland was given him by King Frederick the Second, whoſe generoſity likewiſe ſupplied him with money to erect an edifice in the middle of it, and to furniſh it with all proper inſtruments for obſerving the courſe and motions of the heavenly bodies. Accordingly, about the year 1570, that noble Dane laid the foundation of a magnificent caſtle, which he called Uraniburg, (or the City of the Heavens) and in a few years the ſtructure was compleated, wherein every thing was ſo well contrived both for pleaſure and convenience, and the inſtruments ſo excellent for making aſtronomical obſervations, that it was looked upon as the fineſt obſervatory in the world *. Here Tycho compoſed his catalogue of ſtars †; but by the fate of

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* The moſt celebrated obſervatories at preſent, are thoſe of Greenwich and Paris, both of royal foundation, the former being built by order of King Charles II. at the ſolicitation of Sir Jonas Moor and Sir Chriſtopher Wren, and the latter by Louis XIV, and both furniſhed with the moſt accurate inſtruments.

† It would be impoſſible to have any diſtinct or regular notion of the ſtars, with reſpect to their number, order, diſtances, &c. without firſt reducing them to proper claſſes, and arranging them in certain forms, under the names of animals or other things, as the Ram, the Bull, the Crown, &c,

of war between Sweden and Denmark, ſometimes the one and ſometimes the other being maſters of the iſland, this famed obſervatory did not ſubſiſt above twenty years, and there are now

ſcarce

&c. which are called Conſtellations. By this means aſtronomers are enabled to form catalogues of the ſtars, and to record their places in the heavens; and thus the obſervations of the ancient and modern aſtronomers may be compared together. Hipparchus, about one hundred and twenty years before Chriſt, is ſaid to be the firſt who framed a catalogue of the ſtars, in which he made uſe of the obſervations of ſome preceding aſtronomers; and his catalogue, which contained 1026, was afterwards copied by Ptolemy, and adjuſted to his own time. In the year 1437, Ulugh Beigh made a new catalogue of 1022 ſtars, which has been tranſlated out of Perſian into Latin by Dr. Hyde. The next who made a catalogue of ſtars from his own obſervations was Tycho Brahe, who rectified the places of 777 ſtars for the year 1600; which Kepler increaſed to 1000, from other obſervations of the ſame aſtronomer. Bayer publiſhed a catalogue of 1160. Hevelius compoſed one of 1888 ſtars, adjuſted to the year 1660, but only ſix hundred and three of thoſe from his own obſervations. The laſt and moſt compleat of all is the Britiſh catalogue, compiled from the obſervations of the accurate Mr. Flamſteed, the firſt aſtronomer to whom the royal obſervatory at Greenwich was committed, and who, as Dr. Halley expreſſes it, ſeemed born for the employment. Here this great man applied himſelf with unwearied pains to obſerve the heavenly bodies for a long courſe of years; but though his obſervations were very numerous, and his papers ſwelled to a great bulk, nothing appeared from him in publick worthy ſo much expence and preparation. This occaſioned prince George of Denmark to appoint Sir Iſaac Newton, Dr. Gregory, Dr. Arbuthnot, and other members of the royal ſociety, to inſpect Mr. Flamſteed's papers, and chuſe out of them ſuch as they ſhould think fit for the preſs, purpoſing to print them at his own expence: but the patron of the work dying before the impreſſion was half finiſhed, it lay ſtill for ſome time, till at length it was reſumed by order of Queen Anne, and the care of the preſs committed to Dr. Arbuthnot, and that of correcting and ſupplying the copy to Dr. Halley, Mr. Flamſteed's ſucceſſor in the royal obſervatory. Such

was

ſcarce any footſteps of it remaining, the ruins having been diſperſed into divers places, though part of them ſerved afterwards to build Tycho a handſome ſeat upon his ancient eſtate, which to this day retains the name of Uraniburg.

When Dr. Oliver viſited the iſland of Ween, which he ſays is not above three miles in circumference, he found no remains of Tycho's caſtle, but part of a circular ſtone wall, by which the obſervatory was ſeparated from the other apartments. As to the fine Apparatus of this aſtronomer, the doctor tells us, that moſt of the inſtruments are ſcattered up and down in Germany, though ſome few were ſtill remaining at Copenhagen when he was there; and in particular he ſaw, in the Round Tower, Tycho Brahe's own celeſtial globe, which was ſix feet nine inches in diameter. This tower (he adds) was built in 1601, near the royal college in Copenhagen, for making aſtronomical obſervations, and is above a hundred and fifty feet high. The diameter of the area at top is ſixty feet, and the paſſage up to it wide enough for two coaches, which winding with an eaſy and almoſt imperceptible aſcent, it ſometimes ſerved as a place of parade for the gentry to take the air as well as for an obſervatory.

Having thus deſcribed what ſeemed moſt worthy of notice in Denmark and Norway, we think

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was the riſe and progreſs of the Hiſtoria Cœleſtis, wherein we have a catalogue of about 3000 ſtars, diſtinguiſhed into ſeven degrees of magnitude, in their proper conſtellations, with their longitudes, latitudes, &c. but ſcarce one thouſand of theſe are at any time viſible to the naked eye. This catalogue is rectified for the year 1689; and as nothing was wanting either in the Apparatus or obſerver, it may be looked upon, ſo far as it goes, as a perfect work.

think it not improper to proceed towards the pole, and take a view of Spitzbergen or Greenland. We are ſenſible, indeed, that geographers conſider this, and ſeveral other countries not thoroughly diſcovered, as diſtinct from any of the four parts of the world; but as Greenland lies directly northward from the north cape of Norway, and it is not yet known to be joined to America, we ſhall look upon it as belonging to Europe, and therefore ſpeak of it in this place, without the apprehenſion of being cenſured as immethodical.

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